SIEMENS

syngo X-Workplace VB20B

AX

DICOM Conformance Statement

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© Siemens AG, Healthcare Sector 2011,
Siemensstr. 1, D-91301 Forchheim, Germany

Headquarters: Berlin and Munich
Siemens AG, Wittelsbacherplatz 2, D-80333 Munich, Germany

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Network Conformance Statement

1 Conformance Statement Overview

The syngo X-Workplace is a "*syngo*®-based[a]" Multipurpose Workstation for Viewing of Images from various digital imaging procedures. The syngo X-Workplace is designed to be integrated into an environment of medical, DICOM-based devices. The syngo X-Workplace supports Storage and Transfer of images utilizing the DICOM "Storage Service Class", the display of data and retrieval of images from DICOM Archives utilizing the DICOM "Query/Retrieve Service Class". Furthermore the Import from and export to DICOM CD/DVD media is supported. Printing of viewing results is provided with Print Management Services.

Table 1 - Network Services

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Verification		
Verification	Yes	Yes
Transfer (Image SOP Class)		
Computed Radiography Image Storage	Yes	Yes
Computed Tomography Image Storage	Yes	Yes
Digital X-Ray Image Storage - for Presentation	Yes	Yes
Digital X-Ray Image Storage - for Processing	Yes	Yes
Magnetic Resonance Image Storage	Yes	Yes
Secondary Capture Image Storage	Yes	Yes
Ultrasound Image Storage	Yes	Yes
Ultrasound Multi-Frame Image Storage	Yes	Yes
X-Ray Angiographic Image Storage	Yes	Yes
X-Ray Radiofluoroscopic Image Storage	Yes	Yes
Transfer (Non-image SOP Class)		
Enhanced SR	Yes	Yes
Comprehensive SR	Yes	Yes
X-Ray Radiation Dose SR	Yes	Yes
Transfer (Private SOP Class)		
Syngo Non-Image Storage	Yes	Yes
Workflow Management		
Storage Commitment Push Model SOP Class	Yes	Yes
Query/Retrieve		
Patient Root Q/R Information Model - FIND	Yes	Yes
Patient Root Q/R - Information Model - MOVE	Yes	Yes
Patient Root Q/R - Information Model - GET	No	Yes
Study Root Q/R - Information Model - FIND	Yes	Yes
Study Root Q/R - Information Model - MOVE	Yes	Yes
Study Root Q/R - Information Model - GET	No	Yes
Patient/Study Only Q/R - Information Model FIND	Yes	Yes
Patient/Study Only Q/R - Information Model MOVE	Yes	Yes
Patient/Study Only Q/R - Information Model GET	No	Yes
Print Management		
Basic Grayscale Print Management Meta	Yes	No
Basic Color Print Management Meta	Yes	No
Print Job	Yes	No
Presentation LUT	Yes (for Grayscale)	No

[a] *syngo* is a registered trademark of Siemens AG

Table 2 - Media Services

Media Storage Application Profile	Write Files (FSC or FSU)	Read Files (FSR)
Compact Disk - Recordable		
General Purpose on CD-R	Yes (see Note 1)	Yes
Basic Cardiac X-Ray on CD-R	Option (see Note 2)	Yes
1024 X-Ray on CD-R	Yes	Yes
DVD		
1024 X-Ray on DVD	Yes	Yes
General Purpose DVD with JPEG	Yes	Yes

Note 1: with uncompressed setting and no private SOP Class included

Note 2: with “down-size” (512x512) active and only cine multi-frames included

Table 3 - Implementation Identifying Information

Name	Value
Application Context Name	1.2.840.100008.3.1.1.1
Implementation Class UID	1.3.12.2.1107.5.4.7
Implementation Version Name	“SIEMENSXLEOVB20B"

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3 Introduction

3.1 Revision History

Table 4 - Revision History

Product	Product Version	Document Version	Date	Description
syngo X-Workplace	VB11	Rev. 10	12-Nov-07	Version for Final Text
syngo X-Workplace	VB13	Rev. 11	11-Apr-08	Version for Final Text
syngo X-Workplace	VB14	Rev. 13	16-Sep-09	Version for Final Text
syngo X-Workplace	VB14	Rev. 14	24-Mar-10	Version for Final Text
syngo X-Workplace	VB15	Rev. 15	25-Mar-10	Version for Final Text
syngo X-Workplace	VB20B	Rev. 16	04-May-11	Version for Final Text

3.2 Audience

This document is intended for hospital staff, health system integrators, software designers or implementers. It is assumed that the reader has a working understanding of DICOM.

3.3 Remarks

DICOM, by itself, does not guarantee interoperability. However, the Conformance Statement facilitates a first-level validation for interoperability between different applications supporting the same DICOM functionality as SCU and SCP, respectively.

This Conformance Statement is not intended to replace validation with other DICOM equipment to ensure proper exchange of information intended.

The scope of this Conformance Statement is to facilitate communication with Siemens and other vendors' Medical equipment. The Conformance Statement should be read and understood in conjunction with the DICOM Standard [DICOM]. However, by itself it is not guaranteed to ensure the desired interoperability and a successful interconnectivity.

The user should be aware of the following important issues:

- The comparison of conformance statements is the first step towards assessing interconnectivity between syngo X-Workplace and other DICOM-conformant equipment.
- Test procedures should be defined and tests should be performed to validate the connectivity desired. DICOM itself and the conformance parts do not specify this.

3.4 Definitions, Terms and Abbreviations

Definitions, terms and abbreviations used in this document are defined within the different parts of the DICOM standard.

Additional Abbreviations and terms are as follows:

AE	DICOM Application Entity
AET	Application Entity Title
ASCII	American Standard Code for Information Interchange
CSE	Customer Service Engineer
DCS	DICOM Conformance Statement
DICOM	Digital Imaging and Communications in Medicine
FSC	File Set Creator
FSR	File Set Reader
FSU	File Set Updater
GSDF	Grayscale Standard Display Function
IOD	DICOM Information Object Definition
ISO	International Standard Organization
MOD	Magneto-optical Disk
n.a.	not applicable
NEMA	National Electrical Manufacturers Association
O	Optional Key Attribute
PDU	DICOM Protocol Data Unit
PSO	Patient/Study only (DICOM Query/Retrieve Information Model)
PR	Patient Root (DICOM Query/Retrieve Information Model)
R	Required Key Attribute
SCU	DICOM Service Class User (DICOM client)
SCP	DICOM Service Class Provider (DICOM Server)
SOP	DICOM Service-Object Pair
SCS	Specific Character Set
SR	Study Root (DICOM Query/Retrieve Information Model)
TFT	Thin Film Transistor (Display)
U	Unique Key Attribute
UID	Unique Identifier
UTF-8	Unicode Transformation Format-8
VR	Value Representation
X-Workplace	AX-Workstation (for Angiographic/Radiographic viewing & processing)

3.5 References

[DICOM] Digital Imaging and Communications in Medicine (DICOM), NEMA PS 3.1-3.18, 2009[b]

[b] *The DICOM Standard is under continuous maintenance, the current official version is available at http://dicom.nema.org*

4 Networking

4.1 Implementation Model

- **Verification**
  The syngo X-Workplace DICOM Service Tool application requests Verification to proof the ability of a remote DICOM application to respond to DICOM messages. Responding to Verification requests from remote nodes is handled by the Storage SCP.

- **Storage**
  The syngo X-Workplace DICOM implementation is able to initiate associations for Storage of DICOM Composite Information Objects to Remote AEs and to receive and respond to associations for Storage from Remote AEs.

- **Storage Commitment**
  The syngo X-Workplace DICOM implementation is able to initiate requests for Storage Commitment Push (for previously sent DICOM Composite Information Objects) to Remote AEs and is able to receive and respond to Storage Commitment requests from Remote AEs.

- **Query/Retrieve**
  The syngo X-Workplace DICOM application supports the query/retrieve services in a SCP role. Via the user interface, syngo X-Workplace supports Query/Retrieve as SCU to retrieve IODs to the local database.

- **Print**
  The syngo X-Workplace DICOM implementation is able to initiate associations as Print Management SCU for printing of composed film-sheets with one or more DICOM Print AE.

4.1.1 Application Data Flow

The division of syngo X-Workplace into the separate DICOM Application Entities represents a somewhat arbitrary partitioning of functionality. For the purpose of this document they are organized in this manner to detail their independent logical functionality.

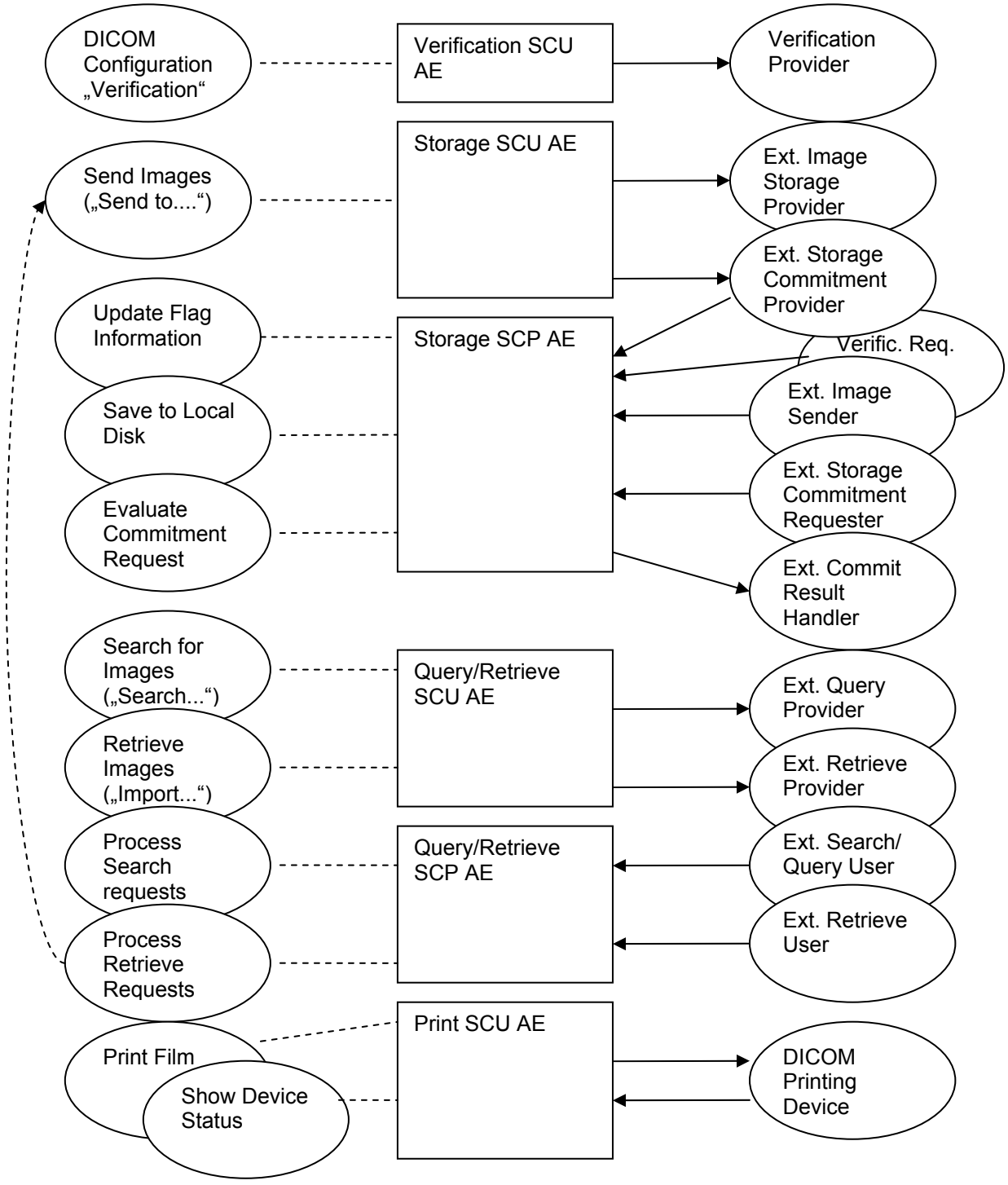


Table 5 - syngo X-Workplace DICOM Data Flow Diagram

- The syngo X-Workplace DICOM Service Tool application opens an association when a "verification" of a remote application is requested during a configuration session. This can be done when entering new data to configure a remote application or to verify existing configuration data.

- The Storage SCU AE can send Composite SOP Instances and automatically request Storage Commitment for sent SOP Instances, if configured.

- The Storage SCP AE can receive incoming DICOM images and add them to the local database. It can respond to external Storage and Verification Requests as a Service Class Provider (SCP) for C-STORE and C-ECHO requests. The Storage SCP AE autonomously handles incoming Storage Commitment requests in SCP role and checks commitment status based on the local database and sends back the related commitment status in N-EVENT-REPORT messages.
  The Storage SCP AE supports Composite SOP Instances as indicated in Chapter "Conformance Statement Overview".

- The Query part of the Query/Retrieve SCU AE uses C-FIND to search a DICOM Database for Patient Study and Series information.
  The Retrieve part of the Query/Retrieve SCU AE uses C-MOVE to initiate a DICOM transfer of composite objects to the local database.

- The Query SCP AE runs autonomously in the background and responds to incoming C-FIND requests based on the matches in the local database and supports retrieve of supported SOP Instances from the local database to a known retrieve destination.

- The Print SCU sends previously compiled, complete (virtual) film-sheets in 1:1 image mode to the printer. The printer status is cyclically monitored by sending Status requests and/or awaiting asynchronous events.

4.1.2 Functional Definitions of Application Entities

4.1.2.1 Functional Definition of Verification-SCU AE

The syngo X-Workplace DICOM Service Tool application opens an association when a "verification" of a remote application is requested during a configuration session. This can be done when entering new data for remote application configuration or to verify existing configuration data.

4.1.2.2 Functional Definition of Storage-SCU AE

The syngo X-Workplace Storage SCU is invoked by the job control interface that is responsible for processing network archival tasks. The job consists of data describing the composite image objects selected for storage and the destination. An association is negotiated with the destination application entity and the image data is transferred using the C-STORE DIMSE-Service. Status of the transfer is reported to the job control interface.

With each successfully completed send job, the syngo X-Workplace DICOM Application will populate the Storage Commitment Push Model Action Information from the SOP Instances sent. Then a Storage Commit Request is triggered, if configured. Depending on configuration, the syngo X-Workplace DICOM application will keep the association open for responses with a configurable time-out, or closes the association and expects responses on a different association that has to be establishes by the remote Storage Commitment SCP.

The commitment status derived from the related trigger response will be indicated in the related Status Flags of the related entity. It is possible to create triggers ("auto rules") from this event.

Note: Only images saved in database can be tagged with Status Flags. Therefore any temporary images sent, will not have any indication about successful commitment.

The Transaction UIDs of the pending commitment request are kept "open" (Job-status is "waiting") for a configurable amount in time (default: 1h). If the "open time" for a pending commitment request has elapsed w/o a related response from the provider, the Transaction UID is removed and the related entities are indicated as "commit failed"

4.1.2.3 Functional Definition of Storage-SCP AE

The Storage SCP component of the syngo X-Workplace DICOM application is operating as background server process. The process starts when the machine is powered on and waits for Storage association requests. Upon accepting an association with a negotiated Presentation Context it starts to receive the Composite Image Objects and imports them to local database.

The Verification SCP is included in the Storage SCP.

The Storage Commitment SCP is running in background and is ready to receive requests when the system is started. Storage Commitment will be checked and returned against the SOP Classes received and kept in the local Storage of the syngo X-Workplace. The response will either be sent “on same” (association not closed by requester) or “on separate” association (requester closed association consecutive to positive request status).

4.1.2.4 Functional Definition of Query/Retrieve-SCU AE

The syngo X-Workplace DICOM query/retrieve SCU requests the remote query/retrieve SCP to perform a search and match to the keys specified in the request in order to display the results in the system’s user interface. Depending on user action (Import) the syngo X-Workplace query/retrieve DICOM SCU sends a C-MOVE DIMSE service to initiate a C-STORE sub-operation on the SCP to start an image transfer from remote Storage SCU (running on Query/Retrieve SCP) to the system’s Storage SCP.

4.1.2.5 Functional Definition of Query/Retrieve-SCP AE

The syngo X-Workplace DICOM query/retrieve SCP responds to C-FIND DIMSE services from remote SCU applications. Depending on further remote request, a C-GET or a C-MOVE involves the system’s DICOM query/retrieve SCP application to initiate a C-STORE association (by triggering and parameterizing the own Storage SCU) to send image objects to a remote Storage SCP.

All components of the DICOM query/retrieve SCP application are operating as background server processes. The processes start when the machine is powered on and then respond to queries based on the records stored in its database.

4.1.2.6 Functional Definition of Print SCU AE

The Print SCU is invoked by the user interface to setup film-sheet layout and whenever an image is ready to be printed on film. The Print SCU will hold and maintain all data needed to compile a complete film-sheet from the data (images, layout, configuration) received. Whenever a film-sheet is ready to print the related data is used to supply the Information to the SOP Classes of the Print Management Service Class. A queue is maintained, in order to intermediately store several film-sheets in case of resource problems on printer. The SCU will only supply and require the mandatory SOP Classes of the Print Management Service Class.

4.1.3 Sequencing of Activities

4.1.3.1 Verification

Newly entered data have to be saved first, before a “verification” of these data is possible.

4.1.3.2 Storage

Prior to sending of SOP Instances the syngo X-Workplace Storage application is capable of invoking processing and down-sizing features in order to prepare image pixel contents into convenient formats for certain multi-vendor environments.

The Storage Commitment trigger is automatically derived from the successful completion of a Send Job.

4.1.3.3 Query/Retrieve

Retrieve of images is only possible if a result from a previous “Search...” operation exists and those entities can be selected for “Import”.

The Query application will not “per se” request information on IMAGE level. The user can select a Series and request image level information with the “Image List” function.

4.2 Application Entity Specification

4.2.1 Verification SCU AE Specification

4.2.1.1 SOP Classes

For SOP Classes supported, please refer to “Table 1 - Network Services” section "Verification" in the Overview.

4.2.1.2 Association Policies

4.2.1.2.1 General

The syngo X-Workplace DICOM Service Tool application attempts to open an association for verification request whenever the "verification" function is activated during network configuration of a remote DICOM application.

4.2.1.2.2 Number of Associations

The syngo X-Workplace DICOM Service Tool application initiates one association at a time to request verification.

4.2.1.2.3 Asynchronous Nature

The syngo X-Workplace DICOM software does not support asynchronous communication (multiple outstanding transactions over a single association).

4.2.1.2.4 Implementation Identifying Information

For Implementation Identifying Information please refer to “Table 3 - Implementation Identifying Information” in the Overview.

4.2.1.3 Association Initiation Policy

4.2.1.3.1 Activity – “Verification”

4.2.1.3.1.1 Description and Sequencing of Activity

The Verification SCU C-ECHO request is initiated by Service and Configuration SW whenever "Verification" is requested. If an association to a remote Application Entity is successfully established, Verification with the configured AET is requested via the open association. If the C-ECHO Response from the remote Application contains a status other than "Success" this will be indicated in the service environment and the association is closed.

4.2.1.3.1.2 Proposed Presentation Contexts

The syngo X-Workplace DICOM application will propose Presentation Contexts as shown in the following table:

Table 6 - Presentation Context Table "Verification"

Presentation Context Table – “Verification”					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

4.2.1.3.1.3 SOP Specific Conformance – Verification SCU

The Application conforms to the definition of the Verification SCU in accordance to the DICOM Standard.

4.2.1.4 Association Acceptance Policy

The Verification SCP is part of the Storage SCP.

4.2.2 Storage SCU AE Specification

4.2.2.1 SOP Classes

For SOP Classes supported, please refer to “Table 1 - Network Services”, sections “Transfer” and “Workflow Management”.

4.2.2.2 Association Policies

4.2.2.2.1 General

The existence of a job queue entry with network destination or an internal trigger from processing a retrieve request, both will activate the DICOM Storage Application. An association request is sent to the destination AE and upon successful negotiation of a Presentation Context the transfer is started. Depending on configuration, processing or down-sizing can be applied to the images prior to send.

With a Send Job successfully completed, the DICOM application will generate the Storage Commitment Action Information which references to all Instances of the processed job. The Commit Request is sent over a single opened association. The syngo X-Workplace will wait for Status responses of the Storage Commitment Request. If the Provider accepts the Storage Commitment with Success Status, the generated Transaction UID, together with study identification data and a time-stamp, is kept. Depending on configuration, the association is closed or kept open for a configured time range. If the association is closed immediately, the response is expected on a different association which is the default setting. Multiple Storage Commitment Requests can be pending.

The default PDU size used will be 528378 bytes.

4.2.2.2.2 Number of Associations

The syngo X-Workplace DICOM application initiates several associations at a time, one for each destination to which a transfer request is being processed in the active job queue list.

The number of simultaneous DICOM associations can be configured via the Service-UI. The dialog can be found in "Configuration / DICOM / General".

4.2.2.2.3 Asynchronous Nature

The syngo X-Workplace DICOM software does not support asynchronous communication (multiple outstanding transactions over a single association).

4.2.2.2.4 Implementation Identifying Information

For Implementation Identifying Information please refer to “Table 3 - Implementation Identifying Information” in the Overview.

4.2.2.3 Association Initiation Policy

If a job with network destination gets active in the job list or a retrieve sub-operation is processed, the syngo X-Workplace DICOM application attempts to initiate a new association for

- DIMSE C-STORE to send images and with successful status a
- N-ACTION DIMSE for the Storage Commitment Push Model Service Class to request commitment.

4.2.2.3.1 Activity – "Send to …"

4.2.2.3.1.1 Description and Sequencing of Activity

The C-STORE request is initiated by an internal daemon process triggered by a job with network destination or the processing of an external C-MOVE retrieve request. If the process successfully establishes an association to a remote Application Entity, it will transfer each image one after another via the open association. Processing features and down-sizing of the pixel matrix can be applied as part of the transfer. If the C-STORE Response from the remote Application contains a status other than "Success" or "Warning", the association is aborted.

With success status for the previous transfer, the syngo X-Workplace Storage application sends the commit request (N-ACTION-RQ) message and waits for acceptance of this request (N-ACTION-RSP). After receiving this, the transaction is marked as "waiting".

Depending on a configuration value, the association will then be closed or kept open. In the first case, there is another configurable timeout giving the number of hours (h) and minutes (m) (by default 1h:0m) to wait for the corresponding commit response (N-EVENT-REPORT). In the second case, this time is the (also configurable) time-out for the association being kept open. In both cases, if the commit response (N-EVENT-REPORT) does not arrive within the configured time-out, the transaction will be marked as failed. The syngo X-Workplace does not re-send objects from a failed Storage Commitment result in any case.

If the commit response (N-EVENT-REPORT) received has the status of "complete - failure exists", the transaction is marked as failed, else the transaction is marked as "completed"; In both cases, a message is shown to the user.

4.2.2.3.1.2 Proposed Presentation Contexts

The syngo X-Workplace DICOM application will propose Storage SCU Presentation Contexts as shown in the following table:

Table 7 - Presentation Context Table "Send to ..."

Presentation Context Table – "Send to …"				
Abstract Syntax	Transfer Syntax		Role	Ext. Neg.
Description	Name List	UID List		
Any image SOP Classes detailed in "Table 1 - Network Services" section „Transfer (Image SOP Class)".	JPEG Lossy Extended JPEG Lossless, Process 14 (selection value 1) JPEG Lossy Baseline (Process 1) Explicit VR Little Endian Explicit VR Big Endian Implicit VR Little Endian	1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2	SCU	None
Any Non-Image SOP Classes detailed in "Table 1 - Network Services" section „Transfer (Non-image SOP Class)".	Explicit VR Little Endian Explicit VR Big Endian Implicit VR Little Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2	SCU	None
Private SOP Class detailed in Chapter "Table 1 - Network Services" section „Transfer (Private SOP Class)".	Explicit VR Little Endian Explicit VR Big Endian Implicit VR Little Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2	SCU	None
Management SOP Class detailed in "Table 1 - Network Services" section "Workflow Management".	Explicit VR Little Endian Explicit VR Big Endian Implicit VR Little Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2	SCU	None

4.2.2.3.1.3 SOP specific Conformance - “Send to …”

The syngo X-Workplace Composing applications will create SC IOD type images when performing special processing that creates Derived Images. The SC IOD will be a Standard Extended SC Storage SOP Class. The Angio Viewer will only display XA/XRF images and has functions to create derived XA/XRF images (Store Monitor images). The InSpace3D application will primarily create CT axial slice images and additional XA corrected images as intermediate results. The 3D viewing application is able to create further 2D (SC) color images to document results from 3D processing.

The (DICOM) application will not change private attributes as long as no permanent modification is done. During a "Save as ..." operation, all private attributes not defined within the scope of the DICOM application will be removed when the new object instance is created.

The “Save…” function in the Angio Viewing application will update standard and private attributes as applicable, but no new Instance is created in this case.

For association and DIMSE level time-outs, please refer to section Configuration of this document.

Optional Attributes

Data Dictionary of DICOM Type 2 and 3 IOD Attributes
Please refer to the related Image Object definition tables in the Annex (section “8.1.1 Created SOP Instances”) for a list of all DICOM IOD attributes of type 2 and 3, which are encoded by the syngo X-Workplace applications.

Specialized Information Object Definitions

The DICOM images sent by syngo X-Workplace DICOM application conform to the DICOM IOD definitions (Standard extended IODs). But they will contain additional private elements, which have to be discarded by a DICOM system when modifying the image.

The DICOM nodes are responsible for data consistency when modifying images. All unknown private attributes have to be removed upon modification!

Data Dictionary of applied private IOD Attributes
Please refer to "8.5 Standard Extended/Specialized/Private SOP Classes" in the Annex for a list of possible private IOD attributes.

4.2.2.3.1.4 SOP specific Conformance - Request Commitment

Storage Commitment is supported for all the SOP Classes detailed in Chapter “Table 1 - Network Services” section “Workflow Management”.

The Referenced Study Component Sequence is not supported.

Storage Media File-Set ID and UID Attributes will not be supported in the commitment request (N-ACTION primitive) invoked by the Storage Commitment SCU.

4.2.2.4 Association Acceptance Policy

See next section “Storage SCP AE Specification”.

4.2.3 Storage SCP AE Specification

4.2.3.1 SOP Classes

For SOP Classes supported, please refer to “Table 1 - Network Services” Sections “Transfer” on page 2.

4.2.3.2 Association Policies

4.2.3.2.1 General

The syngo X-Workplace DICOM application will accept any number of verification or storage SOP classes that are referred to above. There is no limit on the number of presentation contexts accepted except for the DICOM limit. In the event that the Siemens DICOM application runs out of resources, it will reject the association request.

syngo X-Workplace will only accept Associations from known hosts with a known AET (“trusted hosts” concept). Hosts and AETs have to be entered in "Local Service" by a Siemens CSE.

The default PDU size used will be 528378 bytes.

4.2.3.2.2 Number of Associations

The Siemens syngo X-Workplace DICOM application is able to accept multiple associations at a time. It can handle up to 10 associations in parallel.

The number of simultaneous DICOM associations can be configured via the Service-UI. The dialog can be found in "Configuration / DICOM / General".

4.2.3.2.3 Asynchronous Nature

The syngo X-Workplace DICOM software does not support asynchronous communication (multiple outstanding transactions over a single association).

4.2.3.2.4 Implementation Identifying Information

For Implementation Identifying Information please refer to “Table 3 - Implementation Identifying Information” in the Overview.

4.2.3.3 Association Initiation Policy

If the result from a previously accepted Storage Commitment request is evaluated, the syngo X-Workplace DICOM application attempts to initiate a new association for

- DIMSE N-EVENT-REPORT for sending commitment result from a previous request.

4.2.3.3.1 Activity - Return commitment result

Acting as a Storage Commitment Provider, the syngo X-Workplace Storage SCP AE received a Storage Commitment request, has processed the request, and is ready to send back the response, but the association is not open anymore. In this case it will by itself initiate an association to send the storage commitment response (N-EVENT-REPORT) to the SCU.

4.2.3.3.1.1 Proposed Presentation Context

The syngo X-Workplace DICOM application will propose Storage SCP Presentation Contexts for returning Storage Commitment results as shown in the following table:

Table 8 - Presentation Context Table "Return Commitment Result"

Presentation Context Table – "Return Commitment Result"				
Abstract Syntax	Transfer Syntax		Role	Ext. Neg.
Description	Name List	UID List		
Management SOP Class detailed in "Table 1 - Network Services" section "Workflow Management".	Explicit VR Little Endian Explicit VR Big Endian Implicit VR Little Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2	SCP	None

4.2.3.3.1.2 SOP Specific Conformance

Storage Media File-Set ID and UID Attributes will not be supported in the N-EVENT-REPORT primitive invoked by the Storage SCP.

4.2.3.4 Association Acceptance Policy

The syngo X-Workplace DICOM application attempts to accept a new association for

- DIMSE C-ECHO for incoming Verification requests
- DIMSE C-STORE for external image senders request storage of instances
- DIMSE N-ACTION for external systems requesting storage commitment
- DIMSE N-EVENT-REPORT for receiving commitment result from a previous request

4.2.3.4.1 Activity – Save to local disk

4.2.3.4.1.1 Description and Sequencing of Activity

The syngo X-Workplace DICOM application will accept an association and will receive SOP Instances according to the listed presentation contexts on that association and will store the images to the local hard disk if the conformance check is performed successfully.

Upon successful receiving a C-STORE-RQ, the syngo X-Workplace DICOM receiver performs a plausibility test on the received image and available system resources. If this test succeeds, it returns the Status SUCCESS, otherwise one of the following status codes is returned and the association is aborted:

Table 9 - Status codes "Save to Local Disk"

Code	Meaning
A700	Refused: This error status indicates a lack of Resources (e.g. not enough disk space) on the syngo X-Workplace modality.
A900	Invalid Dataset: An error occurred while processing the image, which makes it impossible to proceed. The image will not be stored and the association is aborted.
0110	Processing Error: An error occurred while processing the image, which makes it impossible to proceed. Association is aborted.

Note: The image will be saved after sending the response. If during this operation an error occurs, the association will be aborted. This implies that a C-STORE-RSP with status SUCCESS does not mean that the image was successfully stored into the database.

4.2.3.4.1.2 Accepted Presentation Context

The syngo X-Workplace DICOM application will accept Presentation Contexts as shown in the following table:

Table 10 - Presentation Context Table "Save to Local Disk"

Presentation Context Table – “Save to Local Disk”				
Abstract Syntax	Transfer Syntax		Role	Ext. Neg.
Description	Name List	UID List		
Any image SOP Classes detailed in “Table 1 - Network Services” section „Transfer (Image SOP Class)“.	JPEG Lossy Extended JPEG Lossless, Process 14 (selection value 1) JPEG Lossy Baseline (Process 1) Explicit VR Little Endian Explicit VR Big Endian Implicit VR Little Endian	1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2	SCP	None
Any Non-Image SOP Classes detailed in “Table 1 - Network Services” section „Transfer (Non-image SOP Class)“.	Explicit VR Little Endian Explicit VR Big Endian Implicit VR Little Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2	SCP	None
Private SOP Class detailed in Chapter “Table 1 - Network Services” section „Transfer (Private SOP Class)“.	Explicit VR Little Endian Explicit VR Big Endian Implicit VR Little Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2	SCP	None

4.2.3.4.1.3 SOP specific Conformance

The syngo X-Workplace application conforms to the Full Storage Service Class at Level 2.

With Implicit VR Little Endian Transfer Syntax the syngo X-Workplace DICOM application will remove any Private Attributes not known to the application. Decision on removal of a Private Element is done if there is NO entry in the attribute-dictionary of the DICOM application.

Therefore any Explicit VR Transfer Syntax is preferred to be used by the Storage SCU’s when sending Composite Image Instances to the syngo X-Workplace DICOM application.

If an image instance is received that is identified by a SOP Instance UID which is already used by an Instance stored in database then the actual received image will be discarded. The existing Instance is not superseded.

The order of preference in accepting Transfer Syntaxes within Presentation Contexts or Presentation Contexts with single Transfer Syntaxes is:

Table 11 - Order of Preference Transfer Syntax

Order	DICOM Transfer Syntax
1	JPEG Lossy Extended
2	JPEG Lossless Non-hierarchical
3	JPEG Lossy Baseline
4	RLE Lossless
5	Explicit VR Little Endian
6	Implicit VR Little Endian

With RLE Lossless Transfer Syntax, the syngo X-Workplace DICOM application will decompress the image before storing it into the database.

The following sections will differentiate the attribute contents required for Image Viewing. The syngo X-Workplace DICOM application supports more formats for Storage of Images than for Viewing.

The Angio Viewer will currently only support XA-Images for display.

Image Pixel Attribute Acceptance Criterion for Grayscale Images

The syngo X-Workplace Multi-Modality Viewing application accepts the MONOCHROME1 and MONOCHROME2 photometric interpretation pixel format and graphic overlay with unsigned integer and 8 or 16 bits allocated. The Angio Viewer application accepts only square-sized matrices with 512 or 1024 pixels. Accepted values:

Pixel plane

- samples per pixel (attribute 0028, 0002) = 1
- photometric interpretation (attribute 0028,0004) = "MONOCHROME1"
- photometric interpretation (attribute 0028,0004) = "MONOCHROME2"
- Only aspect ratio 1:1 is supported
- pixel representation (attribute 0028, 0103) = 0
- bits allocated (attribute 0028, 0100) = 8, 16
- bits stored (attribute 0028,0101) = 8, 10, 12
- high bit (attribute 0028,0102) = 7, 9, 11
- (Angio Viewer only) Rows/Columns = 512 or 1024

Overlay plane “embedded”

- overlay type (attribute 60xx, 0040) = "G"
- bits allocated (attribute 60xx, 0100) = 16
- bit position (attribute 60xx, 0102) = 12, 13, 14, 15

Graphic Overlay will be shifted to fill Overlay Planes from Bit 12 and consecutive.

Overlay plane “explicit”

- overlay type (attribute 60xx, 0040) = "G"
- bits allocated (attribute 60xx, 0100) = 1
- bit position (attribute 60xx, 0102) = 0
- overlay data (attribute 60xx, 3000) = supported

The syngo X-Workplace Multi-Modality Viewing application accepts also the MONOCHROME1 and MONOCHROME2 photometric interpretation pixel format with binary 2’s complement integer and 16 bits allocated. This format is not supported for Angio Viewer display. Accepted values:

Pixel plane

- samples per pixel (attribute 0028, 0002) = 1

- photometric interpretation (attribute 0028,0004) = "MONOCHROME1"
- photometric interpretation (attribute 0028,0004) = "MONOCHROME2"
- Only aspect ratio 1:1 is supported
- pixel representation (attribute 0028, 0103) = 1
- bits allocated (attribute 0028, 0100) = 16
- bits stored (attribute 0028,0101) = 16
- high bit (attribute 0028,0102) = 15

Overlay plane

- overlay type (attribute 60xx, 0040) = "G"
- bits allocated (attribute 60xx, 0100) = 1
- bit position (attribute 60xx, 0102) = 0
- overlay data (attribute 60xx, 3000) = supported

For MOD LUT, both the linear LUT (Rescale Slope/Intercept) and the MOD LUT SQ are supported and considered when pixel data is displayed. However there are two limitations. The MOD LUT SQ will be ignored in the following cases:

- 8-Bit signed pixels
- the pixel format is changed by the MOD LUT (e.g. 8bit -> 16bit)

If the MOD LUT SQ contains multiple LUTs, then only the first one is used.

For VOI LUT, both the linear LUT (Window Center/Width) and the VOI LUT SQ are supported (VOI LUT SQ with 8 or 16 bit LUT data)

But if both, a VOI LUT SQ and a linear MOD LUT, are specified within one image, then the value for Rescale Slope is restricted to 1.

If the VOI LUT SQ contains multiple LUTs, then only the first one is used by default. The other VOI LUTs are selectable.

Image Pixel Attribute Acceptance Criterion for Color Images

The syngo X-Workplace Multi-Modality Viewing application supports the RGB color image description with the unsigned integer 24-bit color image plane pixel format. This format is not supported for Angio Viewer or Composing display. Accepted values:

- samples per pixel (attribute 0028, 0002) = 3
- photometric interpretation (attribute 0028,0004) = "RGB"
- pixel representation (attribute 0028, 0103) = 0
- bits allocated (attribute 0028, 0100) = 8
- bits stored (attribute 0028,0101) = 8
- high bit (attribute 0028,0102) = 7
- planar configuration (attribute 0028,0006) = 0 (pixel interleave) or 1 (plane interleave).

The syngo X-Workplace Multi-modality Viewing application supports the “Palette Color” color image description with the unsigned integer and 2’s complement pixel format. This format is not supported for Angio Viewer or Composing display. Accepted values:

- samples per pixel (attribute 0028, 0002) = 1
- photometric interpretation (attribute 0028,0004) = "PALETTE COLOR "
- pixel representation (attribute 0028, 0103) = 0
- bits allocated (attribute 0028, 0100) = 8, 16
- bits stored (attribute 0028,0101) = 8, 16
- high bit (attribute 0028,0102) = 7, 15

Both 8-bit and 16-bit palettes are supported, but NO Segmented Palette Color LUTs.

4.2.3.4.2 Activity – Evaluate Commit Request

4.2.3.4.2.1 Description and Sequencing of Activity

When receiving a Storage Commitment request the syngo X-Workplace DICOM application will perform the necessary steps to check the received list Instances against the local database.

4.2.3.4.2.2 Accepted Presentation Context

The syngo X-Workplace DICOM application will accept Storage Commitment Presentation Contexts as shown in the following table:

Table 12 - Presentation Context Table "Evaluate Commit Request"

Presentation Context Table – “Evaluate Commit Request”				
Abstract Syntax	Transfer Syntax		Role	Ext. Neg.
Description	Name List	UID List		
Management SOP Class detailed in “Table 1 - Network Services” section “Workflow Management”.	Explicit VR Little Endian Explicit VR Big Endian Implicit VR Little Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2	SCP	None

4.2.3.4.2.3 SOP specific Conformance

The syngo X-Workplace Storage SCP AE will return success for images that are stored in the local database and failure for images that are not. However, the committed images can later be deleted by the user at the syngo X-Workplace without notice!

Note: Storage Media File-Set ID and UID Attributes will not be supported in the N-EVENT-REPORT primitive invoked by the Storage Commitment SCP.

4.2.3.4.3 Activity – Update Flag Information

4.2.3.4.3.1 Description and Sequencing of Activity

The syngo X-Workplace DICOM Application has sent a Storage Commitment Request and, being configured to receive response on a separate association, has closed the association, and now it gets an association request from the Storage Commitment SCP that wants to send the results. The syngo X-Workplace DICOM Storage SCP AE will await Storage commitment Notification triggers. Any incoming Notification will be checked for validity, that is, if the related Transaction UID is still part of the Pending Request Queue.

If the Notification is valid, the Notification Event Information is analyzed and the related Instances are marked with the reported status. The over-all Commit Status of the higher Information Entities in the syngo X-Workplace database is derived from propagation of the States of all sub-ordinate Image entities included in a study.

The Status Flags directly affected by Storage Commitment results and indicated in the different entities of the Patient Browser list can be one of

- "AC" or "SC" - Successful Commitment, A means archived to configured Archive destination, whereas S means sent to any other destination.
- "Af" of "Sf" - Commitment failed.
- "A?" or "S?" - Commitment request is sent, response is pending.

In case of failure the user has to repeat the transfer of images to the Archive destination. Another Storage Commitment will be performed after sending is completed successfully.

Note: Setting of Status Flags is only possible for previously stored images. Any temporary image sent, will not be affected by a Commit Response, due to the fact that there is no permanent data-set to be updated.

4.2.3.4.3.2 Accepted Presentation Context

The syngo X-Workplace DICOM application will accept Storage Commitment Presentation Contexts as shown in the following table:

Table 13 - Presentation Context Table "Update Flag Information"

Presentation Context Table – "Update Flag Information"				
Abstract Syntax	Transfer Syntax		Role	Ext. Neg.
Description	Name List	UID List		
Management SOP Class detailed in "Table 1 - Network Services" section "Workflow Management".	Explicit VR Little Endian Explicit VR Big Endian Implicit VR Little Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2	SCP	None

4.2.3.4.3.3 SOP specific Conformance

If the Commitment response (N-EVENT-REPORT) received has the status of "complete - failure exists", the transaction is marked as failed, else the transaction is marked as "completed". In both cases, a message is shown to the user.

The related status flags are set for the committed images in the local database.

The syngo X-Workplace DICOM application will not support the Storage Media File Set ID attributes.

4.2.4 Query/Retrieve SCU Specification

4.2.4.1 SOP Classes

For SOP Classes supported, please refer to “Table 1 - Network Services” section „Query/Retrieve“ in the Overview.

4.2.4.2 Association Policies

4.2.4.2.1 General

With the "Search..." function the query data can be entered and the DICOM query/retrieve application is initiated. An initial query request will be sent out to one remote node that can be selected from a list of configured Query Providers. Depending on the replies to the initial request, sub-sequent query requests are issued to gather further data for lower information level entities. The results compiled from the response data will be displayed to the user. Upon request (Import), the retrieval of selected items is initiated.

The default PDU size used will be 528378 bytes.

4.2.4.2.2 Number of Associations

The syngo X-Workplace DICOM application initiates several associations at a time.

For Query it initiates a new association to the remote node and issues the C-FIND request to retrieve all the requested patient and study information matching the search criteria. The syngo X-Workplace initiates in parallel a second association to the destination node to query for all the series information for each study’s information returned on the first association.

For the Retrieve request (C-MOVE) only one association is initiated per destination.

4.2.4.2.3 Asynchronous Nature

The syngo X-Workplace DICOM software does not support asynchronous communication (multiple outstanding transactions over a single association).

4.2.4.2.4 Implementation Identifying Information

For Implementation Identifying Information please refer to “Table 3 - Implementation Identifying Information” in the Overview.

4.2.4.3 Association Initiation Policy

The syngo X-Workplace DICOM application will request associations for the following DIMSE-C operations as SCU:

Table 14 - Supported DIMSE-C Operations - Query/Retrieve SCU

Supported DIMSE operations	Cancel Request supported
C-FIND	yes
C-MOVE	n.a.

Extended negotiation (relational query) is not supported for the above listed services.

4.2.4.3.1 Activity – Search for images (Search…)

4.2.4.3.1.1 Description and Sequencing of Activity

The associated activity is to fill out a query form with search data and pass it as query to the network application which issues a C-FIND over a previously built association. The remote SCP will respond with related data-entries that will be passed to a browser application. If needed, further associations are opened for querying data from sub-sequent entities. When data transfer is finished, each association is closed.

If the C-FIND Response from the remote Application contains an error status, the association is aborted.

4.2.4.3.1.2 Proposed Presentation Contexts

The syngo X-Workplace DICOM application will propose Presentation Contexts as shown in the following table:

Table 15 - Presentation Context Table "Search..."

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Patient Root Query/Retrieve Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
Study Root Query/Retrieve Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
Patient/Study Only Query/Retrieve Model – FIND	1.2.840.10008.5.1.4.1.2.3.1	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

Within the DICOM network configuration it is configurable which of the two query models (or both) are to be used by the syngo X-Workplace DICOM Query SCU application for each node. If both Abstract Syntaxes are configured, the CFIND SCU will use the Patient Root Model only for C-FIND requests on PATIENT level. For all other levels it will use the STUDY root model.

4.2.4.3.1.3 SOP Specific Conformance

The syngo X-Workplace DICOM Query/Retrieve SCU supports hierarchical queries with all mandatory search keys. The interactive querying of attributes on IMAGE level is not supported by the Query SCU, hence retrieval of individual Objects is possible. The following table describes the search keys for the different query models that the SCU supports. Matching is either wildcard, which means that the user can supply a string containing wildcards, or universal, which means that the attribute is requested as return value.

Table 16 - C-FIND RQ Search Keys

Attribute Name	Tag	Type	Matching	User Input	Return Value Display
Patient Level[c]					
Patient's Name	(0010,0010)	R	Wildcard[d]	Enter value	yes
Patient ID	(0010,0020)	U / R	Wildcard[d]	Enter value	yes
Patient's Birth Date	(0010,0030)	O	Single Value	Enter value	yes
Patient's Sex	(0010,0040)	O	Single Value	Enter value	yes

[c] Patient Root Information Model only
[d] Always a "*" is appended to the user-supplied string

Attribute Name	Tag	Type	Matching	User Input	Return Value Display
Number of Patient related Studies	(0020,1200)	O	Universal(Null)	--	yes[e]
Number of Patient related Series	(0020,1202)	O	Universal(Null)	--	no
Number of Patient related Instances	(0020,1204)	O	Universal(Null)	--	no
Study Level					
Patient's Name[f]	(0010,0010)	R	Wildcard[d]	Enter value	yes
Patient ID	(0010,0020)	U / R	Wildcard[d]	Enter value	yes
Patient's Birth Date[f]	(0010,0030)	O	Single value	Enter value	yes
Patient's Sex[f]	(0010,0040)	O	Single value	Enter value	yes
Study Instance UID	(0020,000D)	U	Single value	Enter value	yes
Study ID	(0020,0010)	R	Wildcard[d]	Enter value	yes
Study Date	(0008,0020)	R	Range	Enter value[g]	yes
Study Time	(0008,0030)	R	Range	Enter value	yes
Accession Number	(0008,0050)	R	Wildcard	Enter value	yes
Study Description	(0008,1030)	O	Wildcard[d]	Enter value	yes
Referring Physician's Name	(0008,0090)	O	Wildcard[d]	Enter value	yes
Name of Physician Reading Study	(0008,1060)	O	Wildcard[d]	Enter value	yes
Modalities in Study	(0008,0061)	O	Single value	Enter value	yes
Number of Patient related Studies	(0020,1200)	O	Universal(Null)	--	no
Number of Patient related Series	(0020,1202)	O	Universal(Null)	--	no
Number of Patient related Instances	(0020,1204)	O	Universal(Null)	--	no
Number of Study related Series	(0020,1206)	O	Universal(Null)	--	yes[h]
Number of Study related Instances	(0020,1208)	O	Universal(Null)	--	no
Series Level					
Series Instance UID	(0020,000E)	U	Single value	Enter value	yes
Series Number	(0020,0011)	R	Single value	Enter value	yes
Modality	(0008,0060)	R	Single value	Enter value	yes
Series Date	(0008,0021)	O	Universal(Null)	--	yes
Series Time	(0008,0031)	O	Universal(Null)	--	yes
Series Description	(0008,103E)	O	Wildcard[d]	Enter value	yes
Body Part Examined	(0018,0015)	O	Single value	--	yes
Performing Physician's Name	(0008,1050)	O	Wildcard[d]	--	yes
Request Attributes Sequence	(0040,0275)	O	--	--	yes
>Requested Procedure ID	(0040,1001)	O	Wildcard[d]	Enter value	yes
>Scheduled Procedure Step ID	(0040,0009)	O	Wildcard[d]	Enter value	yes
Performed Procedure Step Start Date	(0040,0244)	O	Range	Enter value	yes
Performed Procedure Step Start Time	(0040,0245)	O	Range	Enter value	yes
Number of Series related Instances	(0020,1209)	O	Universal(Null)	--	yes
Instance Availability	(0008,0056)	O	Universal(Null)		
Image Level					
SOP Instance UID	(0008,0018)	U	Single Value	--	no
Instance Number	(0020,0013)	R	Universal(Null)	--	yes
SOP Class UID	(0008,0016)	O	Universal(Null)	--	no
Image Comments	(0020,4000)	O	Universal(Null)	--	yes
Number of Frames	(0028,0008)	O	Universal(Null)	--	yes
Content Date	(0008,0023)	O	Universal(Null)	--	yes
Content Time	(0008,0033)	O	Universal(Null)	--	yes

[e] Implicitly visualized in the UI if no study and series search attributes have been entered
[f] Study Root Information Model only
[g] Date range also possible
[h] Implicitly if no series search attributes have been entered

The syngo X-Workplace Search application supports a

- DIMSE C-FIND-CANCEL

if the user wishes to cancel a running Query request via the syngo X-Workplace user interface ("Cancel" button while a "Search…" is active).

The Find SCU interprets following status codes:

Table 17 - Status Codes "Search..."

Service Status	Meaning	Error Codes	Related Fields
Refused	Out of Resources	A700	(0000,0902)
Failed	Identifier does not match SOP Class	A900	(0000,0901) (0000,0902)
	Unable to process	Cxxx	(0000,0901) (0000,0902)
Cancel	Matching terminated due to Cancel request	FE00	None
Success	Matching is complete - No final Identifier is supplied	0000	None
Pending	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys	FF00	Identifier
	Matches are continuing - Warning that one or more Optional Keys were not supported for existence and/or matching for this identifier	FF01	Identifier

4.2.4.3.2 Activity – Retrieve Images (Import…)

4.2.4.3.2.1 Description and Sequencing of Activity

When selecting a data entry in the Query UI and activate the "Import" function, a retrieval request is passed to the syngo X-Workplace DICOM application which issues a C-MOVE service according to the Patient Root or Study Root query model. (The Storage Service Class Conformance Statement describes the C-STORE service, which is generated by processing the C-MOVE service.)

The received image data are processed as described in the storage class SCP descriptions.

The syngo X-Workplace DICOM application will always insert the own Storage SCP AE as "Move Destination".

4.2.4.3.2.2 Proposed Presentation Contexts

The syngo X-Workplace Server DICOM application will propose Presentation Contexts as shown in the following table:

Table 18 - Presentation Context Table "Import..."

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Patient Root Query/Retrieve Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
Study Root Query/Retrieve Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None

Patient/Study Only Query/Retrieve Model – MOVE	1.2.840.10008.5.1.4.1.2.3.2	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

Note: C-MOVE Extended Negotiation will not be supported by the SCU.

4.2.4.3.2.3 SOP Specific Conformance

All required keys will be provided in the retrieve request identifier, as defined in DICOM Standard.

The Move SCU interprets following status codes:

Table 19 - C-MOVE RSP Status Codes

Service Status	Meaning	Error Codes	Related Fields
Refused	Out of Resources - Unable to calculate number of matches	A701	(0000,0902)
	Out of Resources - Unable to perform sub operations	A702	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
	Move destination unknown	A801	(0000,0902)
Failed	Identifier does not match SOP Class	A900	(0000,0901) (0000,0902)
	Unable to process	Cxxx	(0000,0901) (0000,0902)
Cancel	Sub-operations terminated due to Cancel Indication	FE00	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Warning	Sub-operations Complete - One or more Failures of Warnings	B000	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Success	Sub-operations Complete - No Failures or Warning	0000	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Pending	Sub-operations are continuing	FF00	(0000,1020) (0000,1021) (0000,1022) (0000,1023)

4.2.4.4 Association Acceptance Policy

See next section “Query/Retrieve SCP AE Specification”.

4.2.5 Query/Retrieve SCP Specification

4.2.5.1 SOP Classes

For SOP Classes supported, please refer to “Table 1 - Network Services” section „Query/Retrieve“ in the Overview.

4.2.5.2 Association Policies

4.2.5.2.1 General

syngo X-Workplace will only accept Associations from known hosts with a known AET (“trusted hosts” concept). Hosts and AETs have to be entered in "Local Service" by a Siemens CSE.

The default PDU size used will be 528378 bytes.

4.2.5.2.2 Number of Associations

The Siemens syngo X-Workplace DICOM application is able to accept multiple associations at a time. It can handle up to 10 associations in parallel.

The number of simultaneous DICOM associations can be configured via the Service-UI. The dialog can be found in "Configuration / DICOM / General".

4.2.5.2.3 Asynchronous Nature

The syngo X-Workplace DICOM software does not support asynchronous communication (multiple outstanding transactions over a single association).

4.2.5.2.4 Implementation Identifying Information

For Implementation Identifying Information please refer to “Table 3 - Implementation Identifying Information”.

4.2.5.3 Association Initiation Policy

See previous section “Query/Retrieve SCU AE Specification”.

4.2.5.4 Association Acceptance Policy

The syngo X-Workplace DICOM application will accept associations for the following DIMSE-C operations as SCP:

- C-FIND
- C-GET
- C-MOVE
- C-FIND-CANCEL
- C-GET-CANCEL
- C-MOVE-CANCEL

Extended negotiation - which is relational query or retrieve - is not supported for the above listed services. The syngo X-Workplace DICOM application does support multiple C-FIND requests over the same association, while multiple C-MOVE or C-GET operations are not supported over the same association.

4.2.5.4.1 Activity - Process Search Requests

4.2.5.4.1.1 Description and Sequencing of Activity

The Query SCP AE will respond to incoming query requests from a SCU with the query model Patient Root, Study Root and Patient/Study Only. Relational retrieve operation is not supported. The content records of the local database are used to match the incoming query keys and fill the related return keys. With a C-FIND-CANCEL request the running query can be canceled at any time.

Multiple C-FIND requests over the same association are supported.

4.2.5.4.1.2 Accepted Presentation Contexts

The syngo X-Workplace DICOM application will accept Presentation Contexts as shown in the following table:

Table 20 - Presentation Context Table "Process Search Requests"

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Patient Root Query/Retrieve Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Study Root Query/Retrieve Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Patient/Study Only Query/Retrieve Model - FIND	1.2.840.10008.5.1.4.1.2.3.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None

Note: C-FIND Extended Negotiation will not be supported.

The order of preference for accepting Transfer Syntaxes is: 1. Explicit VR Little Endian, 2. Explicit VR Big Endian, 3. Implicit VR Little Endian.

4.2.5.4.1.3 SOP Specific Conformance

The syngo X-Workplace DICOM Query/Retrieve SCP supports hierarchical queries for all mandatory and optional search keys.

The syntactical component structure of the attribute (0010,0010) Patients Name is defined as follows (see [DICOM], Part 5, Definition of PN, Person Name):

<single byte group> =<ideographic group>=<phonetic group>

The Query/Retrieve SCP replies to queries for “Patient's Name” as follows:

1. Matching of Patients Name attribute (0010, 0010) is done case-insensitive.

2. If a search string matches the complete value of a Patient’s Name in the database, a match will be returned.

3. If a search string matches an individual group (single byte, ideographic or phonetic) of a Patient’s Name in the database, a match will be returned.

4. If a search string matches two consecutive groups of a data base object's Patients Name, a match will be returned.

5. Redundant group separators "=" or component separators "^" are treated as insignificant for matching.

6. Leading and trailing blanks within a component or a group of Patient's Name are treated as insignificant for matching.

Except for attribute Patient's Name (0010,0010) any queries for text string attributes will be treated case-sensitive.

The Find SCP will not differentiate "?" and "*", thus "?abc*" will be treated as "*abc*".

If the value for the patient-level unique key "Patient ID" is not known, it will be returned with zero length. The attribute "Image Comments" will not be included in the C-FIND-RSP, if it is not set in the DB, even if it was requested as return key in the related C-FIND-RQ.

Usage of Storage Media File-Set ID, Retrieve AE Title with C-FIND-RSP message:

- The Storage Media File-Set ID - if available - can be returned at Study/Series/Image Level. Only on Image Level, the values of ONLINE, NEARLINE of OFFLINE are returned to indicate the Storage Location of the related Instance.

- The Retrieve AE Title - if available - can only be returned at Image Level (for Patient Root and Study Root models) or Study Level (for Patient/Study Only model).

Relational Queries are not supported.

A remote DICOM AE can cancel the running query by sending a C-FIND-CANCEL. Matches are possibly continuing (more C-FIND response with status PENDING) until the cancel operation takes effect and query matching has completed.

The supported attributes on the various query levels of the three supported information models are listed in the following table.

Table 21 - Query/Retrieve SCP Supported Attributes

Attribute Name	Tag	PR	SR	PSo	Matching
Patient Level (PR or PSo) or Study Level (SR)					
Patient's Name	(0010,0010)	R	R	R	Single value, Wildcard, universal
Patient ID	(0010,0020)	U	R	U	Single Value, Wildcard, universal
Patient's Birth Date	(0010,0030)	O	O	O	Single Value, Range, universal
Patient's Birth Time	(0010,0032)	O	O	O	Single Value, Range, universal
Patient's Sex	(0010,0040)	O	O	O	Single Value, Wildcard, universal
Ethnic Group	(0010,2160)	O	-	O	Single Value, Wildcard, universal
Patient Comments	(0010,4000)	O	O	O	Wildcard, universal
Number of Patient related Studies	(0020,1200)	O	O	O	universal
Number of Patient related Series	(0020,1202)	O	O	O	universal
Number of Patient related Instances	(0020,1204)	O	O	O	universal
Study Level					
Study Instance UID	(0020,000D)	U	U	U	Single Value, List of UIDs
Study ID	(0020,0010)	R	R	R	Single Value, Wildcard, universal
Study Date	(0008,0020)	R	R	R	Single Value, Range, universal
Study Time	(0008,0030)	R	R	R	Single Value, Range, universal
Accession Number	(0008,0050)	R	R	R	Single Value, Wildcard, universal
Referring Physician's Name	(0008,0090)	O	O	O	Single Value, Wildcard, universal
Study Description	(0008,1030)	O	O	O	Single Value, Wildcard, universal

Attribute Name	Tag	PR	SR	PSo	Matching
Admitting Diagnosis Description	(0008,1080)	O	O	O	Single Value, Wildcard, universal
Patient's Age	(0010,1010)	O	O	O	Single Value, Wildcard, universal
Patient's Size	(0010,1020)	O	O	O	Single Value, universal
Patient's Weight	(0010,1030)	O	O	O	Single Value, universal
Occupation	(0010,2180)	O	O	O	Single Value, Wildcard, universal
Additional Patient History	(0010,21B0)	O	O	O	Wildcard, universal
Name of Physician reading the Study	(0008,1060)	O	O	O	Single Value, Wildcard, universal
Modalities in Study	(0008,0061)	O	O	O	Multiple values, universal
Number of Study Related Series	(0020,1206)	O	O	O	universal
Number of Study Related Instances	(0020,1208)	O	O	O	universal
Series Level					
Series Instance UID	(0020,000E)	U	U	-	Single Value, List of UIDs
Series Number	(0020,0011)	R	R	-	Single Value, universal
Modality	(0008,0060)	R	R	-	Single Value, Wildcard, universal
Laterality	(0020,0060)	O	O	-	Single Value, Wildcard, universal
Body Part Examined	(0018,0015)	O	O	-	Single Value, Wildcard, universal
Patient Position	(0018,5100)	O	O	-	Single Value, Wildcard, universal
Smallest Pixel Value in Series	(0028,0108)	O	O	-	Single Value, universal
Largest Pixel Value in Series	(0028,0109)	O	O	-	Single Value, universal
Protocol Name	(0018,1030)	O	O	-	Single Value, Wildcard, universal
Series Date	(0008,0021)	O	O	-	Single Value, Range, universal
Series Time	(0008,0031)	O	O	-	Single Value, Range, universal
Series Description	(0008,103E)	O	O	-	Single Value, Wildcard, universal
Operator's Name	(0008,1070)	O	O	-	Single Value, Wildcard, universal
Performing Physician's name	(0008,1050)	O	O	-	Single Value, Wildcard, universal
Performed Procedure Step Start Date	(0040,0244)	O	O	-	universal
Performed Procedure Step Start Time	(0040,0245)	O	O	-	universal
Number of Series related Instances	(0020,1209)	O	O	-	universal
Image or SR Document Level					
SOP Instance UID	(0008,0018)	U	U	-	Single Value, List of UIDs
Image Number	(0020,0013)	R	R	-	Single Value, universal
Content Date	(0008,0023)	O	O	-	Single Value, Range, universal
Content Time	(0008,0033)	O	O	-	Single Value, Range, universal
Modality	(0008,0060)	O	O	-	Single Value, Wildcard, universal
Image Comments	(0020,4000)	O	O	-	universal
Referenced Request Sequence	(0040,A370)	O	O	-	Sequence matching
>Accession Number	((0008,0050)	O	O	-	Single value, universal
>Requested Procedure ID	(0040,1000)	O	O	-	Single value, universal
Concept Name Code Sequence	(0040,A043)	O	O	-	Sequence matching
>Code Value	(0008,0100)	O	O	-	Single Value, Wildcard, universal
>Coding Scheme Designator	(0008,0102)	O	O	-	Single Value, Wildcard, universal
>Coding Scheme Version	(0008,0103)	O	O	-	Single Value, Wildcard, universal
>Code Meaning	(0008,0104)	O	O	-	Single Value, Wildcard, universal
Template Identifier	(0040,DB00)	O	O	-	Single Value, Wildcard, universal
Completion Flag	(0040,A491)	O	O	-	Single Value, Wildcard, universal
Verification Flag	(0040,A493)	O	O	-	Single Value, Wildcard, universal
Verifying Observer Sequence	(0040,A073)	O	O	-	Sequence matching
>Verifying Organization	(0040,A027)	O	O	-	Single Value, Wildcard, universal
>Verifying Date Time	(0040,A030)	O	O	-	Single Value, Range, universal
>Verifying Observer Name	(0040,A075)	O	O	-	Single Value, Wildcard, universal
>Verifying Observer Identification Code Sequence	(0040,A088)	O	O	-	Sequence matching
>>Code Value	(0008,0100)	O	O	-	Single Value, Wildcard, universal
>>Coding Scheme Designator	(0008,0102)	O	O	-	Single Value, Wildcard, universal

Attribute Name	Tag	PR	SR	PSo	Matching
>>Coding Scheme Version	(0008,0103)	O	O	-	Single Value, Wildcard, universal
>>Code Meaning	(0008,0104)	O	O	-	Single Value, Wildcard, universal

PR = Patient Root Model, **SR** = Study Root Model, **PSo** = Patient/Study Only Model
O = Optional Key, **R** = Required Key, **-** = not supported or applicable

The “Process Search Requests” activity can return the following status codes:

Table 22 - Status Codes Process Search Request

Service Status	Meaning	Error Codes	Related Fields
Refused	Out of Resources	A700	(0000,0902)
Failed	Identifier does not match SOP Class	A900	(0000,0901) (0000,0902)
	Unable to process	C001	(0000,0901) (0000,0902)
Cancel	Matching terminated due to Cancel request	FE00	None
Success	Matching is complete - No final Identifier is supplied	0000	None
Pending	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys	FF00	Identifier
	Matches are continuing - Warning that one or more Optional Keys were not supported for existence and/or matching for this identifier	FF01	Identifier

4.2.5.4.2 Activity - Process Retrieve Requests

4.2.5.4.2.1 Description and Sequencing of Activity

The associated activity is to respond to retrieve requests initiated from a foreign SCU. Relational retrieve operation is not supported.

Multiple C-GET or C-MOVE requests over the same association are not supported.

4.2.5.4.2.1 Accepted Presentation Contexts

The syngo X-Workplace DICOM application will accept Presentation Contexts as shown in the following table:

Table 23 - Presentation Context Table "Process Retrieve Requests"

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Patient Root Query/Retrieve Model - GET	1.2.840.10008.5.1.4.1.2.1.3	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Study Root Query/Retrieve Model - GET	1.2.840.10008.5.1.4.1.2.2.3	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Patient/Study Only Query/Retrieve Model - GET	1.2.840.10008.5.1.4.1.2.3.3	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Patient Root Query/Retrieve Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None

Study Root Query/Retrieve Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Patient/Study Only Query/Retrieve Model - MOVE	1.2.840.10008.5.1.4.1.2.3.2	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None

Note: C-FIND Extended Negotiation will not be supported.

The order of preference for accepting Transfer Syntaxes is: 1. Explicit VR Little Endian, 2. Explicit VR Big Endian, 3. Implicit VR Little Endian.

4.2.5.4.2.2 SOP Specific Conformance

Relational retrieve operation is not supported.

All unique keys have to be supplied according to the selected Query/Retrieve Level. The related tables in the C-FIND SCP section will give information about "U" marked key attributes.

The C-STORE can only be performed to AEs that are configured in the syngo X-Workplace.

The “Process Retrieve Requests” activity can return the following status codes:

Table 24 - Status Codes "Process Retrieve Requests"

Service Status	Meaning	Error Codes	Related Fields
Refused	Out of Resources - Unable to calculate number of matches	A701	(0000,0902)
	Out of Resources - Unable to perform sub operations	A702	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Failed	Identifier does not match SOP Class	A900	(0000,0901) (0000,0902)
	Unable to process	C001	(0000,0901) (0000,0902)
Cancel	Sub-operations terminated due to Cancel Indication	FE00	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Warning	Sub-operations Complete - One or more Failures of Warnings	B000	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Success	Sub-operations Complete - No Failures or Warning	0000	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Pending	Sub-operations are continuing	FF00	(0000,1020) (0000,1021) (0000,1022) (0000,1023)

4.2.6 Print SCU Specification

4.2.6.1 SOP Classes

For SOP Classes supported, please refer to “Table 1 - Network Services” section “Print Management” in the Overview.

4.2.6.2 Association Policies

4.2.6.2.1 General

Whenever a film-sheet is completely set up and printed by command or automated rule, the job is prepared for processing. As soon as the queue is ready to process the job, it is activated and worked according the processing data. The Print application will initiate an association to the print destination and process the printing.

The default PDU size used will be 528378 bytes.

4.2.6.2.2 Number of Associations

The syngo X-Workplace DICOM application initiates one association at a time for each different print device configured.

4.2.6.2.3 Asynchronous Nature

The syngo X-Workplace DICOM print application does not support asynchronous communication (multiple outstanding transactions over a single association).

4.2.6.2.4 Implementation Identifying Information

For Implementation Identifying Information please refer to “Table 3 - Implementation Identifying Information” in the Overview.

4.2.6.3 Association Initiation Policy

Triggered by the Print job queue the Print Management SCU establishes an association by using the DICOM association services. An N-GET request determines the printer status prior to printing. If the printer status is “normal”, the print job is started.

After the last film is printed from queue, the Print application will leave open the association for another 60 seconds. If a new film job is ready for printing within this time-limit, the job will be immediately processed over the still open association. If there is no new job, the association is closed.

During the “idle-time” (no open association to printer) the Print application will issue a cyclic camera status request (using N-GET of the Printer SOP Class) every 5 minutes.

4.2.6.3.1 Activity - Print Film

4.2.6.3.1.1 Description and Sequencing of Activity

The film sheet is internally processed, converted to a Standard/1-1 page and then the page image is sent. Status is controlled by awaiting any N-EVENT message through the transfer until the last image or film-sheet is sent.

If the response from the remote application contains a status other than Success or Warning the association is aborted.

4.2.6.3.1.2 Proposed Presentation Context

The syngo X-Workplace DICOM application will propose Presentation Contexts as shown in the following table:

Table 25 - Presentation Context Table "Print Film"

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Basic Grayscale Print Management Meta SOP class	1.2.840.10008.5.1.1.9	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Basic Color Print Management Meta SOP class	1.2.840.10008.5.1.1.18	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Basic film session SOP class	1.2.840.10008.5.1.1.1	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Basic Film Box SOP class	1.2.840.10008.5.1.1.2	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Basic Grayscale Image Box SOP class	1.2.840.10008.5.1.1.4	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Basic Color Image Box SOP class	1.2.840.10008.5.1.1.4.1	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Printer SOP class	1.2.840.10008.5.1.1.16	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Print Job SOP class	1.2.840.10008.5.1.1.14	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Presentation LUT SOP class	1.2.840.10008.5.1.1.23	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

4.2.6.3.1.3 SOP Specific Conformance

The syngo X-Workplace DICOM print management SCU conforms to the DICOM Basic Grayscale Print Management Meta SOP Class and the Basic Color Print Management Meta SOP Class.

The application uses a setting platform to define the properties of the connected DICOM SCP, e.g.:

- maximum number of print jobs in the queue
- maximum number of print copies
- supported film sizes of the connected DICOM SCP
- supported film formats of the DICOM SCP
- lookup table definition.

The printing is only suspended in the case of a failure return status of the SCP.

Basic Film Session SOP Class

The Basic Film Session information object definition describes all the user-defined parameters, which are common for all the films of a film session. The Basic Film Session refers to one or more Basic Film Boxes and that are printed on one hardcopy printer.

The syngo X-Workplace DICOM print management SCU supports the following DIMSE Service elements for the Basic Film Session SOP Class as SCU:

- N-CREATE
- N-DELETE

The Basic Film Session SOP Class N-CREATE-RQ (SCU) uses the following attributes:

Table 26 - Basic Film Session N-CREATE Attributes

Attribute Name	Tag	Usage SCU	Supported Values
Number of Copies	(2000,0010)	U	"1"
Medium Type	(2000,0030)	U	BLUE FILM CLEAR FILM PAPER
Film Destination	(2000,0040)	U	MAGAZINE PROCESSOR

The number of copies sent to the DICOM Printer is always 1, the job is sent n times for n copies.

The affected SOP Instance UID received with N-CREATE-RSP message will be kept internally and used for later requests (e.g. N-DELETE-RQ) on the Basic Film Session – see below:

Attribute Name	Tag	Source of Information
Requested SOP Instance UID	(0000,1000) → (0000,1001)	Affected SOP Instance UID of N-CREATE-RSP on Basic Film Session

The N-DELETE-RQ on the Basic Film Session SOP Class is used to remove the complete Basic Film Session SOP Instance hierarchy.

The Basic Film Session SOP class interprets the following status codes (from N-CREATE-RSP, N-DELETE-RSP messages):

Table 27 - Basic Film Session Status Codes

Service Status	Meaning	Error Codes
Failure	Film session SOP instances hierarchy does not contain film box SOP instances	C600
	Unable to create print job, print queue is full	C601
	Image size is larger than images box size	C603
Warning	Memory allocation not supported	B600
	Film session printing is not supported	B601
	Film box does not contain image box (empty page)	B602
Success	Film belonging to the film session are accepted for printing	0000

Basic Film Box SOP Class

The Basic Film Box information object definition describes all the user-defined parameter of one film of the film session. The Basic Film Box information description defines the presentation parameters, which are common for all images on a given sheet of film.

The Basic Film Box refers to one or more Image Boxes.

Supported Service Elements as SCU are:

- N-CREATE
- N-ACTION
- N-DELETE

The Basic Film Box SOP class N-CREATE-RQ message uses the following attributes (the actual values for each attribute depend on DICOM printer configuration within the syngo X-Workplace DICOM print management SCU):

Table 28 - Basic Film Box N-CREATE Attributes

Attribute Name	Tag	Usage SCU	Supported Values
Image Display Format	(2010,0010)	M	STANDARD\1,1
Referenced Film Session Sequence	(2010,0500)	M	n.a.
> Referenced SOP Class UID	(0008,1150)	M	1.2.840.10008.5.1.1.1
> Referenced SOP Instance UID	(0008,1155)	M	
Film Orientation	(2010,0040)	M	PORTRAIT
Film Size ID	(2010,0050)	M	8INX10IN, 10INX12IN, 10INX14IN, 11INX14IN,, 14INX14IN, 14INX17IN, 24CMX24CM, 24CMX30CM
Magnification Type	(2010,0060)	M	BILINEAR, CUBIC, NONE, REPLICATE
Max Density	(2010,0130)	U	> 0
Min Density	(2010,0120)	U	50 > value > 0
Illumination	(2010,015E)	U	> 0 Required if Presentation LUT is present.
Reflective Ambient Light	(2010,0160)	U	> 0 Required if Presentation LUT is present.
Referenced Presentation LUT Sequence	(2050,0500)	U	

The N-CREATE-RSP message from the Print SCP includes the Referenced Image Box Sequence with SOP Class/Instance UID pairs which will be kept internally and used for the subsequent Basic Image Box SOP Class N-SET-RQ messages.

When all Image Boxes (including parameters) for the film-sheet have been set, the DICOM print manager will issue an N-ACTION-RQ message with the SOP Instance UID of the Basic Film Box and the Action Type ID of 1.

The affected SOP Instance UID received with N-CREATE-RSP message will be kept internally and used for later requests (e.g. N-DELETE-RQ) on the Basic Film Box - see below:

Attribute Name	Tag	Source of Information
Requested SOP Instance UID	(0000,1000) → (0000,1001)	Affected SOP Instance UID of N-CREATE-RSP on Basic Film Box

The Basic Film Box SOP class interprets the following status codes:

Table 29 - Basic Film Box Status Codes

Service Status	Meaning	Error Codes
Failure	Unable to create print job, print queue is full	C601
	Image size is larger than images box size	C603
Warning	Film box does not contain image box (empty page)	B603
	Requested MinDensity or MaxDensity outside of Printer's operating range	B605
Success	Film accepted for printing	0000

Basic Grayscale Image Box SOP Class

The Basic Grayscale Image Box information object definition is the presentation of an image and image related data in the image area of a film. The Basic Grayscale mage Box information describes the presentation parameters and image pixel data, which apply to a single image of a sheet of film.

The Grayscale Image Box SOP Class uses only the N-SET-RQ with the following attributes:

Table 30 - Basic Grayscale Image Box N-SET Attributes

Attribute Name	Tag	Usage SCU	Supported Values
Image Position	(2020,0010)	M	1
BASIC Grayscale Image Sequence	(2020,0110)	M	n.a.
> Samples per Pixel	(0028,0002)	M	1
> Photometric Interpretation	(0028,0004)	M	MONOCHROME2
> Rows	(0028,0010)	M	<Printer/Film config>
> Columns	(0028,0011)	M	<Printer/Film config>
> Pixel Aspect Ratio	(0028,0034)	M	(1:1)
> Bits Allocated	(0028,0100)	M	8, 16
> Bits Stored	(0028,0101)	M	8, 12
> High Bit	(0028,0102)	M	7, 11
> Pixel Representation	(0028,0103)	M	0
> Pixel Data	(7FE0,0010)	M	

The Grayscale Image Box SOP class interprets the following status codes:

Table 31 - Basic Grayscale Image Box Status Codes

Service Status	Meaning	Error Codes
Failure	Image contains more pixel than printer can print in Image Box	C603
	Insufficient memory in printer to store the image	C605
Warning	Requested MinDensity or MaxDensity outside of Printer's operating range	B605
Success		0000

Basic Color Image Box SOP Class

The Basic Color Image Box information object definition is the presentation of an image and image related data in the image area of a film. The Basic Color Image Box information describes the presentation parameters and image pixel data, which apply to a single image of a sheet of film.

The Color Image Box SOP Class uses only the N-SET-RQ with the following attributes:

Table 32 - Basic Color Image Box N-SET Attributes

Attribute Name	Tag	Usage SCU	Supported Values
Image Position	(2020,0010)	M	1
BASIC Color Image Sequence	(2020,0111)	M	n.a.
> Samples per Pixel	(0028,0002)	M	3
> Photometric Interpretation	(0028,0004)	M	RGB
> Planar Configuration	(0028,0006)	M	0
> Rows	(0028,0010)	M	<Printer/Film config>
> Columns	(0028,0011)	M	<Printer/Film config>
> Pixel Aspect Ratio	(0028,0034)	M	(1:1)
> Bits Allocated	(0028,0100)	M	8

Attribute Name	Tag	Usage SCU	Supported Values
> Bits Stored	(0028,0101)	M	8
> High Bit	(0028,0102)	M	7
> Pixel Representation	(0028,0103)	M	0
> Pixel Data	(7FE0,0010)	M	

The Color Image Box SOP class interprets the following status codes:

Table 33 - Basic Color Image Box Status Codes

Service Status	Meaning	Error Codes
Failure	Image contains more pixel than printer can print in Image Box	C603
	Insufficient memory in printer to store the image	C605
Warning	Image size larger than image box size	B604
Success		0000

Presentation LUT SOP Class

The Presentation LUT tailors image hardcopy printing for specific modalities, applications and user preferences.

The output of the Presentation LUT is Presentation Values (P-Values). P-Values are approximately related to human perceptual response. They are intended to facilitate common input for hardcopy. P-Values are intended to be independent of the specific class or characteristics of the hardcopy device.

The Presentation LUT SOP Class uses only the N-CREATE-RQ with the following attributes:

Table 34 - Presentation LUT N-CREATE Attribute

Attribute Name	Tag	Usage SCU	Supported Values
Presentation LUT Shape	(2050,0020)	U	IDENTITY

The affected SOP Instance UID received with N-CREATE-RSP message will be kept internally and is used for later requests on the Basic Film Box (N-CREATE-RQ) and on the Presentation LUT (N-DELETE-RQ) - see below:

Attribute Name	Tag	Source of Information
Requested SOP Instance UID	(0000,1000) → (0000,1001)	Affected SOP Instance UID of N-CREATE-RSP on Presentation LUT

The Presentation LUT SOP class interprets the following status codes:

Table 35 - Presentation LUT Status Codes

Service Status	Meaning	Error Codes
Warning	Requested MinDensity or MaxDensity outside of HCD's operating range. HCD will use its respective minimum or maximum density value instead.	B605
Success	Presentation LUT successfully created	0000

Printer SOP Class

The Printer SOP Class allows to monitor the status of the hardcopy printer in a synchronous and an asynchronous way.

The SCU uses the mandatory N-EVENT Report DIMSE service to monitor the changes of the printer status in an asynchronous way.

The following returned information is supported:

Table 36 - Used Printer N-EVENT Report Attributes

Event-type Name	Event	Attributes	Tag	Usage SCU
Normal	1			
Warning	2	Printer Status Info	(2110,0020)	U
Failure	3	Printer Status Info	(2110,0020)	U

Table 37 - Mandatory Printer N-GET-RSP, N-EVENT-REPORT-RQ attributes

Attribute Name	Tag	Usage SCP	Supported Values
Printer Status	(2110,0010)	M	NORMAL, FAILURE, WARNING
Printer Status Info	(2110,0020)	M	See tables in Annex for details.

Note: For a detailed description on how syngo X-Workplace reacts on different printer status messages, please refer to the Annex section “DICOM Print SCU - detailed status displays”.

Printer Job SOP Class

The Print Job SOP Class allows to monitor the execution of the print process.

The syngo X-Workplace DICOM Print Management application supports the optional N-EVENT-REPORT DICMSE Service to receive the changes of the Print Job Status in an asynchronous way.

It can receive Events from the Print SCP asynchronously:

- N-EVENT-REPORT

Note: The underlying syngo DICOM Print AE does not support receiving of N-EVENT-REPORT messages from camera during open print sessions. This is typically configurable in the camera setup.

The following information is supported:

Table 38 - Used Print Job N-EVENT Report Attributes

Event-type Name	Event	Attributes	Tag	Usage SCU
Normal	1	Execution Status Info	(2100,0030)	U
		Print Job ID	(2100,0010)	-- (Print Queue Management SOP Class not supported)
		Film Session Label	(2000,0050)	U
		Printer Name	(2110,0030)	U
Printing	2	Execution Status Info	(2100,0030)	U
		Print Job ID	(2100,0010)	-- (Print Queue Management SOP Class not supported)
		Film Session Label	(2000,0050)	U
		Printer Name	(2110,0030)	U
Done	3	Execution Status Info	(2100,0030)	U
		Print Job ID	(2100,0010)	-- (Print Queue Management SOP Class not supported)
		Film Session Label	(2000,0050)	U
		Printer Name	(2110,0030)	U
Failure	4	Execution Status Info	(2100,0030)	U
		Print Job ID	(2100,0010)	-- (Print Queue Management SOP Class not supported)

Event-type Name	Event	Attributes	Tag	Usage SCU
		Film Session Label	(2000,0050)	U
		Printer Name	(2110,0030)	U

Note: For a detailed description on how syngo X-Workplace reacts on different printer status messages, please refer to the Annex section “DICOM Print SCU - detailed status displays”.

4.2.6.3.2 Activity - Show Device Status

4.2.6.3.2.1 Description and Sequencing of Activity

With no printing activity ongoing (“idle time”), the syngo X-Workplace DICOM Print SCU application will cyclically request the printer status to update the related printer state in the Printing UI.

4.2.6.3.2.2 Proposed Presentation Context

The syngo X-Workplace DICOM application will propose Presentation Contexts as shown in the following table:

Table 39 - Presentation Context Table "Show Device Status"

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Printer SOP class	1.2.840.10008.5.1.1.16	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

4.2.6.3.2.3 SOP Specific Conformance

The Printer SOP Class allows to monitor the status of the hardcopy printer in a synchronous and an asynchronous way.

The Print SCU AE application will cyclically “ask” the Printer (SCP) for its status synchronously:

- N-GET as SCU

The following information is supported:

Table 40 - Used Printer N-EVENT Report Attributes

Event-type Name	Event	Attributes	Tag	Usage SCU
Normal	1			
Warning	2	Printer Status Info	(2110,0020)	U
Failure	3	Printer Status Info	(2110,0020)	U

Table 41 - Mandatory Printer N-GET-RSP, N-EVENT-REPORT-RQ Attributes

Attribute Name	Tag	Usage SCP	Supported Values
Printer Status	(2110,0010)	M	NORMAL, FAILURE, WARNING
Printer Status Info	(2110,0020)	M	See tables in Annex for details.

Note: For a detailed description on how syngo X-Workplace reacts on different printer status messages, please refer to the Annex section “DICOM Print SCU - detailed status displays”.

4.2.6.4 Association Acceptance Policy

The syngo X-Workplace DICOM application does not support Print Management Services as an SCP.

4.3 Network Interfaces

4.3.1 Physical Network Interface

The DICOM Interface of the syngo X-Workplace provides DICOM TCP/IP Network Communication Support and uses the TCP/IP protocol stack from the operating system. It uses the MergeCOM subroutine library. All available Ethernet interfaces are supported. Restrictions might occur for slow connections, e.g. 10baseT.

4.3.2 Additional Protocols

not applicable.

4.4 Configuration

4.4.1 AE Title/Presentation Address Mapping

Local AE Titles

According to the DICOM Standard, the AET string can be up to 16 characters long and must not contain any extended characters, only 7-bit ASCII characters (excluding Control Characters).

Note: The current implementation of syngo does not allow Spaces and special characters (like &<> ") in the AE title string.

Change of the default AE Titles chosen by the system can be performed in the Service UI under “Configuration / DICOM / General” item - first page.

Table 42 - Default AET Characteristics

Application Entity	Default AE Title	TCP/IP Port
Verification SCU	STU_<hostname>	-
Verification SCP		104 (fixed)
Storage SCU		-
Storage SCP		104 (fixed)
Query/Retrieve SCU		-
Query/Retrieve SCP		104 (fixed)
Print SCU	PRI_<hostname>	-

Remote AE Titles

All external AE Titles have to be configured to be able to communicate with syngo X-Workplace. The “trusted hosts” concept of syngo X-Workplace only allows communication with known nodes.

For each remote AE the following data and capabilities can be configured:

Table 43 - Remote AE Configuration Items

Remote AE configuration item	Comment
Host Name	As defined in the network domain. This has to be configured also for any DICOM AE that wishes to connect to SCP services of syngo X-Workplace.
TCP/IP address	As defined in the network domain. This has to be configured also for any DICOM AE that wishes to connect to SCP services of syngo X-Workplace.
Logical Name	Name for the AE used in the user interfaces of the syngo X-Workplace applications.
AE Title	AET, as provided by network administration
Port Number	Port Number, as provided by network administration
If **Storage** Service support is checked	
Transfer Syntax	Selection of uncompressed transfer Syntaxes supported by remote AE
Compression	Selection of additional compression Syntaxes supported for remote AE
Default Node	“first default”/”second default”/[“no default”] - activating this feature will show “Send to <logical name>” in the Transfer tool menu for quick access.
Preference Node	When checked, the remote AE will be assigned to a keyboard shortcut key.
Archive Node	When checked, sending to remote AET will set status of **a**(rchived), else **s**(ent) is indicated.
Default Archive	When checked, the remote AE will be listed as default archive in User interfaces.
Graphics in Pixel Data	When checked, the DICOM overlay will not be encoded in attribute (60xx,3000) Overlay Data, but masked in the “unused bits” of the pixel data (only for uncompressed transfer syntaxes). For backwards compatibility with legacy AE.
Select SC node	Select a previously configured node as target for Storage Commitment when sending DICOM objects to the configured AE. Default is the same node as to which the Objects are sent.
Select SC AET	Select AET that corresponds to the above selected node that receives the Storage Commitment request. Default is the above specified “AE Title”.
SC Result in same association	When checked the syngo X-Workplace DICOM application will await the Storage Commitment N-EVENT-REPORT on the same association. Default is “not checked” (= different association).
SC result timeout	Timeout in hours and minutes to wait at the open association. Default: 01**:**00 (hour**:**minutes).

If **Storage Commitment** Service support is checked	
n.a.	The related Storage Commitment configuration is either in the Storage section of the same AET or different AET (in case the current AET is only Storage Commitment Provider).
If **Query** Service support is checked	
provides DICOM Query model	The Query models supported by this AET can be selected. When possible, the STUDY ROOT model should preferably be configured
If **Retrieve** Service support is checked	
n.a.	Checking Retrieve support for an AET is the only needed configuration item. This will allow access to the "Import" feature in the Query result browser.

4.4.2 Parameters

System parameters can be changed in the Service UI under "Configuration / DICOM / General" item - second page.

Table 44 - General Parameter Settings and Timeouts

Time-out Values				
Parameter	**Default Value [sec]**	**Min [sec]**	**Max [sec]**	**Comment**
Accepting/Rejecting an Association Request	60	15	600	Wait for an Association Request or wait for a Peer to shut down the Association
Association Open Request	60	15	600	Wait for a reply to an Association Accept Request
Association Close Request	60	15	600	Wait for a reply to an Association Release Request
Accepting a Message over Network	60	15	600	Wait for a Network Write to be accepted
Waiting for Data between TCP/IP Packets	60	15	600	Wait for Data between TCP/IP packets
Response from Remote Node for Storage/Query/Retrieve	600	15	3600	Time between Service Request and Service Response
Accept network connect	60	15	600	
General Transfer Setting				
Simultaneous DICOM associations	10	1	10	Number of simultaneous associations running.
Maximum PDU Size	528378 bytes	4kByte	1MByte	Proposed PDU size, each selectable value is doubled from previous, starting with 4kB. Additionally for optimization for some networks 28kByte and 528378 bytes are provided.
Implicit Raw data transfer	Yes	n.a.	n.a.	Private Non-image SOP Class objects are implicitly included in transfer/export - yes, no

5 Application Profile Conformance Statement

The following "Offline Media Application Profiles (incl. private extensions)" are supported by syngo X-Workplace archive options.

Table 45 - Supported Application Profiles

Application Profile
Basic Cardiac
1024 Extended Cardiac
General Purpose CDR
syngo private Application Profile

5.1 Implementation Model

5.1.1 Application Data Flow Diagram

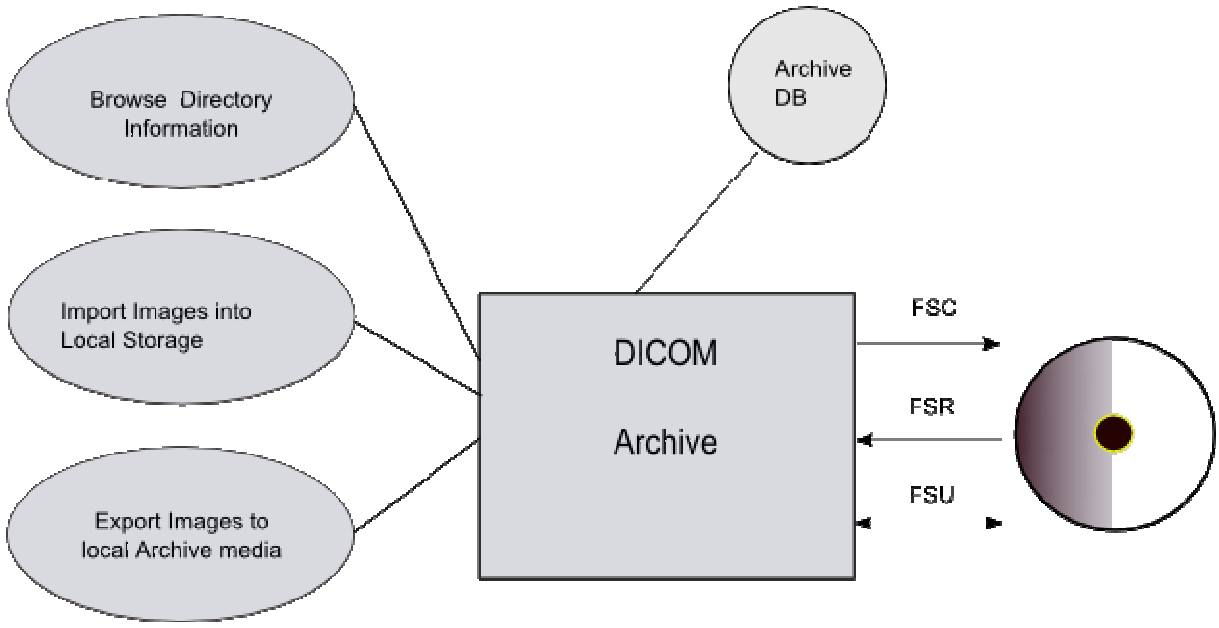


Table 46 - Application Data Flow DICOM Archive

The DICOM archive application will serve as an interface to the CD-R/DVD offline medium device.

The DICOM Archive application will support the 120mm CD-R and DVD medium, the 130mm 2.3 GB R/W MOD and the 130mm 4.1 GB R/W MOD.

The FSU role will update new SOP Instances only to media with pre-existing File-sets conforming to the Application Profiles supported.

The contents of the DICOMDIR will temporarily be stored in Archive-Database.

5.1.2 Functional Definitions of AEs

The syngo X-Workplace DICOM offline media storage application consists of the DICOM Archive application entity serving all interfaces to access offline media. The DICOM Archive application is capable of

- creating a new File-set onto an unwritten medium (Export to…).
- updating an existing File-set by writing new SOP Instances onto the medium (Export to...).
- importing SOP Instances from the medium onto local storage
- reading the File-sets DICOMDIR information into temporary database and pass it to display applications.

5.1.3 Activities

5.1.3.1 Description and Sequencing of Activity FSR

The DICOM Archive application will not perform transfers until the Directory information of the DICOMDIR is completely read in and displayed in the Browser.

5.1.4 Implementation Identifying Information

For Implementation Identifying Information please refer to “Table 3 - Implementation Identifying Information” in the Overview.

5.2 AE Specifications

5.2.1 DICOM Archive Specification

The DICOM Archive provides Standard conformance to Media Storage Service Class (Interchange Option). In addition augmented conformance is provided to store extra data attributes important for the full feature support of the syngo X-Workplace product SW. Details are listed in following Table:

Table 47 - Mapping of Application Profiles Supported

Application Profiles Supported	Activity	Role	SC Option
PRI-SYNGO-CD PRI-SYNGO-DVD PRI-SYNGO-MOD23 (option) PRI-SYNGO-MOD41 (option) AUG-XA1K-CD *1	Browse Directory Information	FSR	Interchange
	Import into local Storage	FSR	Interchange
	Export to local Archive Media	FSC, FSU	Interchange
STD-GEN-CD STD-XABC-CD STD-XA1K-CD	Browse Directory Information	FSR	Interchange
	Import into local Storage	FSR	Interchange

*1 – With no Private SOP Class used, the PRI-SYNGO-CD/DVD profile definitions are appropriate to describe the augmentation of the STD-XA1K Profiles.

On syngo-based Products the Private Extended *syngo* Profile (PRI-SYNGO-CD or optional the PRI-SYNGO-MOD23 or PRI-SYNGO-MOD41 or PRI-SYNGO-DVD) will be used preferably by the system. The General Purpose Interchange Profile (STD-GEN-CD), Basic Cardiac Profile (STD-XABC-CD) and 1024 X-Ray Angiographic Profile (STD-XA1K-CD) will be supported with read capability of the related media.

5.2.1.1 File Meta Information for the Application Entity

The Source Application Entity Title is set by configuration and is same as used for Storage provider. See Chapter "Media Configuration" for details.

5.2.1.2 Activities of DICOM Archive

5.2.1.2.1 Activity "Browse Directory Information"

The DICOM Archive application acts as FSR using the interchange option when requested to read the media directory.

The DICOM archive application will read the DICOMDIR and insert those directory entries that are valid for the application profiles supported, into a local database. The database can then be used for browsing media contents.

Note: IconImageSQ is also supported in DICOMDIR. But only those Icon Images with Bits Allocated (0028,0100) equal to 8 and size of 64x64 or 128x128 pixels are imported into database and are visible in the Browser.

5.2.1.2.1.1 Media Storage Application Profile

See “Table 47 - Mapping of Application Profiles Supported” in section 5.2.1 for the Application Profiles listed that invoke this Application Entity for the Browse Directory Information activity.

5.2.1.2.2 Activity "Import into Local Storage"

The DICOM Archive application acts as FSR using the interchange option when being requested to read SOP Instances from the medium into the local storage.

The SOP Instance(s) selected from the media directory will be copied into the local storage. Only SOP Instances, that are valid for the application profile supported and are listed as supported by the Storage SCP Conformance section (Network DCS, 5.1.3), can be retrieved from media storage.

For media conforming to the STD-GEN-CD Profile the following SOP classes will be supported as FSR:

Table 48 - STD-GEN-CD Profile Supported SOP Classes

Information Object Definition	SOP Class UID	Transfer Syntax UID
X-Ray Angiographic Image	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
X-Ray Radiofluoroscopic Image	1.2.840.10008.5.1.4.1.1.12.2	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
CR Image	1.2.840.10008.5.1.4.1.1.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
DX Image – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
DX Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
CT image	1.2.840.10008.5.1.4.1.1.2	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
MR Image	1.2.840.10008.5.1.4.1.1.4	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
Ultrasound Image	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
Ultrasound Multi-frame Image	1.2.840.10008.5.1.4.1.1.3.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
CSA Non-Image	1.3.12.2.1107.5.9.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1

5.2.1.2.2.1 Media Storage Application Profile

See “Table 47 - Mapping of Application Profiles Supported” in section 5.2.1 for the Application Profiles listed that invoke this Application Entity for the Import into Local Storage activity.

5.2.1.3 Activity “Export to Local Archive Media”

The DICOM Archive application acts as FSU (for media with existing DICOM file-set) or FSC (media not initialized) using the interchange option when requested to copy SOP Instances from the local storage to local Archive Medium.

The DICOM Archive application will receive a list of SOP Instances to be copied to the local archive medium. According to the state of the medium inserted (new medium, Medium with DICOM file-set) the validity of the SOP Instances according to the applicable profile is checked. Only valid SOP Instances are accepted.

When the DICOM archive application is requested to copy SOP Instances the preferred application profile according configuration (AUG-XA1K-CD or PRI-SYNGO-xxx) will be used to validate and copy the referred SOP Instances. When creating a new file-set no Descriptor File will be created and no File-set Descriptor File ID will be used.

The DICOM Archive application will not finalize the medium.

With the down-sizing feature of the syngo X-Workplace DICOM application, a copy of images in Cardiac Format (512x512, 8Bit) can be written onto medium. Please refer to the Storage section "Send to…(with down-sizing)" activity description to learn more about the type of conversion that is performed on the Instances.

5.2.1.3.1.1 Media Storage Application Profile

See “Table 47 - Mapping of Application Profiles Supported” in section 5.2.1 for the Application Profiles listed that invoke this Application Entity for the Export to Local Archive Media activity.

5.3 Augmented and Private Application Profiles

5.3.1 Augmented Application Profiles

5.3.1.1 AUG-XA1K-CD

With no private Siemens Non-Images stored onto Medium, the definitions of the PRI-SYNGO-CD Profile are applicable to denote the augmentations for the STD-XA1K-CD Standard Profile.

Storage of Private Information Objects will only be supported with reference to a Private Application Profile (see other section).

5.3.2 Private Application Profiles

5.3.2.1 PRI-SYNGO-XXX

5.3.2.1.1 Class and Profile Identification

This sections define a Private Application Profile Class for “*syngo*® speaking” modalities or applications.

The identifier for this class shall be PRI-SYNGO. This class is intended to be used for interchange of extended and private Information Objects via CD-R/DVD or re-writeable magneto-optical disk (MOD) offline media between dedicated acquisition or workstation modalities build from common *syngo* architecture.

The specific application profiles in this PRI-SYNGO class are shown in the following table:

Table 49 - Private Application Profile Identifications

Application Profile	Identifier	Description
“*syngo* speaking” System on CD-R	PRI-SYNGO-CD	Handles interchange of Composite SOP Instances and privately defined SOP Instances (Siemens Non-Image IOD).
“*syngo* speaking” System on 2.3 GB MOD	PRI-SYNGO-MOD23	Handles interchange of Composite SOP Instances and privately defined SOP Instances (Siemens Non-Image IOD).
“*syngo* speaking” System on 4.1 GB MOD	PRI-SYNGO-MOD41	Handles interchange of Composite SOP Instances and privately defined SOP Instances (Siemens Non-Image IOD).
“*syngo* speaking” System on DVD-R	PRI-SYNGO-DVD	Handles interchange of Composite SOP Instances and privately defined SOP Instances (Siemens Non-Image IOD).

Equipment claiming conformance for this *syngo* Application Profile Class shall make a clear statement on handling of the private defined SOP Instances.

5.3.2.1.2 Clinical Context

This application profile facilitates the interchange of original acquired and derived images and private data related to them. Typical media interchange would be from in-lab acquisition equipment to dedicated workstations and archive systems with specific extensions to handle the private data objects (in both directions).

Additionally, images (from MR,CT,US,NM,DX,RF) used to prepare procedures, multi-modality images (e.g. integrated US) and images derived from primary diagnostic images, such as annotations, quantitative analysis images, reference images, screen capture images may be interchanged via this profile.

5.3.2.1.2.1 Roles and Service Class Options

This Application Profile uses the Media Storage Service Class defined in DICOM PS 3.4 with the Interchange Option.

The Application Entity shall support one or more of the roles of File Set Creator (FSC), File Set Reader (FSR), and File Set Updater (FSU), defined in PS 3.10.

File Set Creator

The Application Entity acting as a File-Set Creator generates a File Set under the PRI-SYNGO Application Profiles.

File Set Creators shall be able to generate the Basic Directory SOP Class in the DICOMDIR file with all the subsidiary Directory Records related to the Image SOP Classes and Private SOP Classes stored in the File Set. In case of the PRI-SYNGO-DVD profile only multi-session is supported. For both profile a multi-session media can be finalized.

In case of the PRI-SYNGO-CD profile, the FSC shall offer the ability to either finalize the disc at the completion of the most recent write session (no additional information can be subsequently added to the disc) or to allow multi-session (additional information may be subsequently added to the disc).

Note: A multiple volume (a logical volume that can cross multiple physical media) is not supported by this Application Profile Class. If a set of Files, e.g., a Study, cannot be written entirely on one CD-R, the FSC will create multiple independent DICOM File-Set such that each File-Set can reside on a single CD-R medium controlled by its individual DICOMDIR file. The user of the FSC can opt to use written labels on the discs to reflect that there is more than one disc for this set of files (e.g., a Study).

File Set Reader

The role of the File Set Reader shall be used by Application Entities which receive the transferred File Set.

File Set Readers shall be able to read all the defined SOP Instances files defined for the specific Application Profiles to which a conformance claim is made, using all the defined Transfer Syntaxes.

File Set Updater

The role of the File Set Updater shall be used by Application Entities, which receive a transferred File Set and update it by the addition of processed information.

File Set Updaters shall be able to read and update the DICOMDIR file. File-Set Updaters do not have to read the image/private information objects. File-Set Updaters shall be able to generate any of the SOP Instances files defined for the specific Application Profiles to which a conformance claim is made, and to read and update the DICOMDIR file.

In case of the PRI-SYNGO-CD profile, the FSU shall offer the ability to either finalize a disc at the completion of the most recent write session (no additional information can be subsequently added to the disc) or to allow multi-session (additional information may be subsequently added to the disc). In case of the PRI-SYNGO-DVD profile only multi-session is supported. For both profile a multi-session media can be finalized.

Note (for CD-R and DVD-R): If the disc has not been finalized, the File-Set Updater will be able to update information assuming there is enough space on the disc to write a new DICOMDIR file, the information, and the fundamental CD-R/DVD-R control structures. CD-R/DVD-R control structures are the structures that inherent to the CD-R/DVD-R standards; see PS 3.12

5.3.2.1.3 PRI-SYNGO Profiles

5.3.2.1.3.1 SOP Classes and Transfer Syntaxes

These Application Profiles are based on the Media Storage Service Class with the Interchange Option.

Table 50 - Private Profile SOP Classes and Transfer Syntaxes

Information Object Definition	SOP Class UID	Transfer Syntax UID	FSC	FSR	FSU
Basic Directory	1.2.840.10008.1.3.10	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	M
X-Ray Angiographic Image	1.2.840.10008.5.1.4.1.1.12.1	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	M	M	O
X-Ray Angiographic Image	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	O	M	O
X-Ray Angiographic Image	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
X-Ray Angiographic Image	1.2.840.10008.5.1.4.1.1.12.1	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
X-Ray Radiofluoroscopic Image	1.2.840.10008.5.1.4.1.1.12.2	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	M	M	O
X-Ray Radiofluoroscopic Image	1.2.840.10008.5.1.4.1.1.12.2	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	O	M	O
X-Ray Radiofluoroscopic Image	1.2.840.10008.5.1.4.1.1.12.2	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
X-Ray Radiofluoroscopic Image	1.2.840.10008.5.1.4.1.1.12.2	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	O	M	O
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
CR Image	1.2.840.10008.5.1.4.1.1.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
CR Image	1.2.840.10008.5.1.4.1.1.1	JPEG Lossless Process 14 (selection value 1)	O	M	O

Information Object Definition	SOP Class UID	Transfer Syntax UID	FSC	FSR	FSU
		1.2.840.10008.1.2.4.70			
CR Image	1.2.840.10008.5.1.4.1.1.1	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
CR Image	1.2.840.10008.5.1.4.1.1.1	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
DX Image – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
DX Image – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	O	M	O
DX Image – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
DX Image – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
DX Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
DX Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	O	M	O
DX Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
DX Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
CT image	1.2.840.10008.5.1.4.1.1.2	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
CT Image	1.2.840.10008.5.1.4.1.1.2	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	O	M	O
CT Image	1.2.840.10008.5.1.4.1.1.2	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
CT Image	1.2.840.10008.5.1.4.1.1.2	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
MR Image	1.2.840.10008.5.1.4.1.1.4	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
MR Image	1.2.840.10008.5.1.4.1.1.4	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	O	M	O
MR Image	1.2.840.10008.5.1.4.1.1.4	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
MR Image	1.2.840.10008.5.1.4.1.1.4	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
Ultrasound Image	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
Ultrasound Image	1.2.840.10008.5.1.4.1.1.6.1	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	O	M	O
Ultrasound Image	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
Ultrasound Image	1.2.840.10008.5.1.4.1.1.6.1	JPEG Lossy (baseline or extended)	O	O	O

Information Object Definition	SOP Class UID	Transfer Syntax UID	FSC	FSR	FSU
		1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51			
Ultrasound Image	1.2.840.10008.5.1.4.1.1.6.1	RLE Lossless 1.2.840.10008.1.2.5	O	M	O
Ultrasound Multi-frame Image	1.2.840.10008.5.1.4.1.1.3.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
Ultrasound Multi-frame Image	1.2.840.10008.5.1.4.1.1.3.1	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	O	M	O
Ultrasound Multi-frame Image	1.2.840.10008.5.1.4.1.1.3.1	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
Ultrasound Multi-frame Image	1.2.840.10008.5.1.4.1.1.3.1	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
Ultrasound Multi-frame Image	1.2.840.10008.5.1.4.1.1.3.1	RLE Lossless 1.2.840.10008.1.2.5	O	M	O
NM Image	1.2.840.10008.5.1.4.1.1.20	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
NM Image	1.2.840.10008.5.1.4.1.1.20	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	O	M	O
NM Image	1.2.840.10008.5.1.4.1.1.20	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
NM Image	1.2.840.10008.5.1.4.1.1.20	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
CSA Non-Image	1.3.12.2.1107.5.9.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	O	M	O

FSC, FSR, FSU – denote the requirements for those roles

5.3.2.1.3.2 Physical Media and Formats

The PRI-SYNGO-CD Profile requires the 120mm CD-R physical media with the ISO/IEC 9660 Media Format, as defined in PS3.12.

The PRI-SYNGO-DVD Profile requires the 120mm DVD physical media with the UDF 2.01 Media Format, as defined in PS3.12.

The PRI-SYNGO-MOD23 Profile requires the 130mm 2.3 GB R/W MOD physical medium with the PCDOS Media Format, as defined in PS3.12.

The PRI-SYNGO-MOD41 Profile requires the 130mm 4.1 GB R/W MOD physical medium with the PCDOS Media Format, as defined in PS3.12.

5.3.2.1.3.3 Directory Information in DICOMDIR

Conforming Application Entities shall include in the DICOMDIR File the Basic Directory IOD containing Directory Records at the Patient and subsidiary levels appropriate to the SOP Classes in the File-set. All DICOM files in the File-set incorporating SOP Instances defined for the specific Application profile, shall be referenced by Directory Records.

Note

DICOMDIRs with no directory information are not allowed by this Application Profile

Privately defined IODs will be referenced by "PRIVATE" Directory Records.

Additional Keys

File-set Creators and Updaters are required to generate the mandatory elements specified in PS 3.3, Annex F of the DICOM Standard. The below attached table specifies the additional associated keys. At each directory record level other additional data elements can be added, but it is not required that File Set Readers be able to use them as keys. Refer to the Basic Directory IOD in PS 3.3.

Table 51 - Additional Directory Record Keys

Key Attribute	Tag	Directory Record Level	Type	Notes
Patient's Birth Date	(0010,0030)	PATIENT	2C	required, if present in SOP Instance
Patient's Sex	(0010,0040)	PATIENT	2C	required, if present in SOP Instance
Series Date	(0008,0021)	SERIES	3	
Series Time	(0008,0031)	SERIES	3	
Institute Name	(0008,0080)	SERIES	2C	required, if present in SOP Instance
Institution Address	(0008,0081)	SERIES	2C	required, if present in SOP Instance
Series Description	(0008,103E)	SERIES	3	
Performing Physician's Name	(0008,1050)	SERIES	2C	required, if present in SOP Instance
Image Type	(0008,0008)	IMAGE	1C	required, if present in SOP Instance
SOP Class UID	(0008,0016)	IMAGE	3	
SOP Instance UID	(0008,0018)	IMAGE	3	
Content Date	(0008,0023)	IMAGE	3	
Content Time	(0008,0033)	IMAGE	3	
Referenced Image Sequence	(0008,1140)	IMAGE	1C	required, if present in SOP Instance
> Referenced SOP Class UID	(0008,1150)			
> Referenced SOP Instance UID	(0008,1155)			
Image Position (Patient)	(0020,0032)	IMAGE	2C	required, if present in SOP Instance
Image Orientation (Patient)	(0020,0037)	IMAGE	2C	required, if present in SOP Instance
Frame of Reference UID	(0020,0052)	IMAGE	2C	required, if present in SOP Instance
Rows	(0028,0010)	IMAGE	3	
Columns	(0028,0011)	IMAGE	3	
Pixel Spacing	(0028,0030)	IMAGE	1C	required, if present in SOP Instance
Calibration Image	(0050,0004)	IMAGE	2C	required, if present in SOP Instance
Icon Image Sequence	(0088,0200)	IMAGE	3	Required for Image SOP Classes
> Samples per Pixel	(0028,0002)			1

Key Attribute	Tag	Directory Record Level	Type	Notes
> Photometric Interpretation	(0028,0004)			MONOCHROME2
> Rows	(0028,0010)			128 for XA, 64 for others
> Columns	(0028,0011)			128 for XA, 64 for others
> Bits Allocated	(0028,0100)			8
> Bits Stored	(0028,0101)			8
> High Bit	(0028,0102)			7
> Pixel Representation	(0028,0103)			0
> Pixel Data	(7FE0,0010)			Icon Image
Curve Number	(0020,0024)	CURVE	1C	required, if present in SOP Instance

Private Directory Records are supported by this Application Profile Class at the following Level - IMAGE. The PRIVATE Directory Records will have required elements in addition to the mandatory elements specified in PS 3.3.

The following table will list the additional required keys for PRIVATE Directory Records:

Table 52 - Private Directory Record Keys

Key Attribute	Tag	Directory Record Level	Type	Notes
Private Record UID	(0004,1432)	PRIVATE	1	See Conformance Statement
SOP Class UID	(0008,0016)	PRIVATE	1C	required, if present in SOP Instance
SOP Instance UID	(0008,0018)	PRIVATE	1C	required, if present in SOP Instance
Image Type	(0008,0008)	PRIVATE	3	
Acquisition Date	(0008,0022)	PRIVATE	3	
Acquisition Time	(0008,0032)	PRIVATE	3	
Acquisition Number	(0020,0012)	PRIVATE	3	
CSA Data Type	(0029,xx08)	PRIVATE	1	private owner code = SIEMENS CSA NON-IMAGE
CSA Data Version	(0029,xx09)	PRIVATE	3	private owner code = SIEMENS CSA NON-IMAGE

Icon Images

Directory Records of type SERIES or IMAGE may include Icon Images. The Icon Image pixel data shall be as specified in PS 3.3 "Icon Image Key Definition", and restricted such, that Bits Allocated (0028,0100) and Bits Stored (0028,0101) shall be equal 8, and Rows (0028,0010) and Columns (0028,0011) shall be equal to 128 for XA Images and 64 for all other Images. The Photometric Interpretation (0028,0004) shall always be restricted to "MONOCHROME2".

PRIVATE Directory Records will not contain Icon Image information.

For the Siemens private Non-Image IOD, the following values will be used in private Directory Records:

Attribute	Tag	Value used
Private Record UID	(0004,1432)	1.3.12.2.1107.5.9.1
SOP Class UID	(0008,0016)	1.3.12.2.1107.5.9.1

5.3.2.1.3.4 Other Parameters

This section defines other parameters common to all specific Application Profiles in the PRI-SYNGO class which need to be specified in order to ensure interoperable media interchange.

Multi-Frame JPEG Format

The JPEG encoding of pixel data shall use Interchange Format (with table specification) for all frames.

5.4 Media Configuration

5.4.1 Single- / Multi-Session CD Burning

Please refer to most recent Service / Configuration documentation of syngo X-Workplace for changing between the single-session and multi-session recording modes

5.4.2 “Viewer on CD”

Please refer to most recent Service / Configuration documentation of syngo X-Workplace for changing between the

ACOM.PC Lite 2.0 or ***syngo* FastView**

as application that is included onto the medium as part of the “Viewer on CD” feature, if the feature is checked in the Media Creation user interface (see also next configuration item).

5.4.3 Auto-Labeling

Please refer to most recent Service / Configuration documentation of syngo X-Workplace for activating the auto-labeling of CD media to avoid the label inquiry dialog when using automatic media export. The auto-labeling can be activated with the “Viewer on CD” feature being implicitly checked or not.

6 Support of Extended Character Sets

The syngo X-Workplace DICOM application supports the following character sets as defined in the four tables below:

Table 53 - Supported Single-Byte Character Sets (w/o Code Ext.)

Character Set Description	Defined Term	ISO registration number	Character Set
Default repertoire	none	ISO_IR 6	ISO 646:
Latin alphabet No. 1	ISO_IR 100	ISO_IR 100	Supplementary set
		ISO_IR 6	ISO 646:
Latin alphabet No. 2	ISO_IR 101	ISO_IR 101	Supplementary set
		ISO_IR 6	ISO 646
Latin alphabet No. 3	ISO_IR 109	ISO_IR 109	Supplementary set
		ISO_IR 6	ISO 646
Latin alphabet No. 4	ISO_IR 110	ISO_IR 110	Supplementary set
		ISO_IR 6	ISO 646
Cyrillic	ISO_IR 144	ISO_IR 144	Supplementary set
		ISO_IR 6	ISO 646
Arabic	ISO_IR 127	ISO_IR 127	Supplementary set
		ISO_IR 6	ISO 646
Greek	ISO_IR 126	ISO_IR 126	Supplementary set
		ISO_IR 6	ISO 646
Hebrew	ISO_IR 138	ISO_IR 138	Supplementary set
		ISO_IR 6	ISO 646
Latin alphabet No. 5	ISO_IR 148	ISO_IR 148	Supplementary set
		ISO_IR 6	ISO 646
Japanese	ISO_IR 13	ISO_IR 13	JIS X 0201: Katakana
		ISO_IR 14	JIS X 0201: Romaji

Table 54 - Supported Single-Byte Character Sets (with Code Ext.)

Character Set Description	Defined Term	Standard for Code Extension	ESC sequence	ISO registration number	Character Set
Default repertoire	ISO 2022 IR 6	ISO 2022	ESC 02/08 04/02	ISO-IR 6	ISO 646
Latin alphabet No.1	ISO 2022 IR 100	ISO 2022	ESC 02/13 04/01	ISO-IR 100	Supplementary set
		ISO 2022	ESC 02/08 04/02	ISO-IR 6	ISO 646
Latin alphabet No.2	ISO 2022 IR 101	ISO 2022	ESC 02/13 04/02	ISO-IR 101	Supplementary set
		ISO 2022	ESC 02/08 04/02	ISO-IR 6	ISO 646
Latin alphabet No.3	ISO 2022 IR 109	ISO 2022	ESC 02/13 04/03	ISO-IR 109	Supplementary set
		ISO 2022	ESC 02/08 04/02	ISO-IR 6	ISO 646
Latin alphabet No.4	ISO 2022 IR 110	ISO 2022	ESC 02/13 04/04	ISO-IR 110	Supplementary set
		ISO 2022	ESC 02/08 04/02	ISO-IR 6	ISO 646

Character Set Description	Defined Term	Standard for Code Extension	ESC sequence	ISO registration number	Character Set
Cyrillic	ISO 2022 IR 144	ISO 2022	ESC 02/13 04/12	ISO-IR 144	Supplementary set
		ISO 2022	ESC 02/08 04/02	ISO-IR 6	ISO 646
Arabic	ISO 2022 IR 127	ISO 2022	ESC 02/13 04/07	ISO-IR 127	Supplementary set
		ISO 2022	ESC 02/08 04/02	ISO-IR 6	ISO 646
Greek	ISO 2022 IR 126	ISO 2022	ESC 02/13 04/06	ISO-IR 126	Supplementary set
		ISO 2022	ESC 02/08 04/02	ISO-IR 6	ISO 646
Hebrew	ISO 2022 IR 138	ISO 2022	ESC 02/13 04/08	ISO-IR 138	Supplementary set
		ISO 2022	ESC 02/08 04/02	ISO-IR 6	ISO 646
Latin alphabet No.5	ISO 2022 IR 148	ISO 2022	ESC 02/13 04/13	ISO-IR 148	Supplementary set
		ISO 2022	ESC 02/08 04/02	ISO-IR 6	ISO 646
Japanese	ISO 2022 IR 13	ISO 2022	ESC 02/09 04/09	ISO-IR 13	JIS X 0201: Katakana
		ISO 2022	ESC 02/08 04/10	ISO-IR 14	JIS X 0201-1976: Romaji

Table 55 - Supported Multi-Byte Character Sets (w/o Code Ext.)

Character Set Description	Defined Term	ISO registration number	Character Set
Unicode	ISO_IR 192	ISO 10646	Unicode in UTF-8
Chinese	GB18030	GB18030	GB 18030-2000 (China Association for Standardization)

Table 56 - Supported Multi-Byte Character Sets (with Code Ext.)

Character Set Description	Defined Term	Standard for Code Extension	ESC sequence	ISO registration number	Character Set
Japanese	ISO 2022 IR 87	ISO 2022	ESC 02/04 04/02	ISO-IR 87	JIS X 0208: Kanji
	ISO 2022 IR 159	ISO 2022	ESC 02/04 02/08 04/04	ISO-IR 159	JIS X 0212: Supplementary Kanji set
Chinese[i]	ISO 2022 IR 58	ISO 2022	ESC 02/04 04/01	ISO-IR 58	GB2312-80 (China Association for Standardization)

When there is a mismatch between the SCS tag (0008,0005) and the characters in an IOD received by the system, then the following measures are taken to make the characters DICOM conform:

[i] Note: This Character Set is an extension of DICOM for the Chinese language.

- Try to import with ISO_IR 100. If ISO_IR 100 fails, convert each illegal character to a '?'.

  There are now three categories of character sets which have to be differentiated because of their different encoding formats:
  - Conventional ISO character sets: ISO_IR 6, ISO 2022 IR 6, ISO_IR 100, etc. → encoded in ISO 2022
  - ISO IR_192 → encoded in UTF-8
  - GB18030 → encoded in GB18030

It is not possible to recognize the following mismatches automatically on receiving or importing:

- An attribute value is encoded in ISO_IR 192 ← → (0008,0005) contains a conventional ISO character set as primary character set.
- An attribute value is encoded in GB18030 ← → (0008,0005) contains a conventional ISO character set as primary character set.
- An attribute value is encoded in ISO 2022 ← → (0008,0005) contains ISO_IR 192.
- An attribute value is encoded in ISO 2022 ← → (0008,0005) contains GB18030

An IOD that contains one of the above mentioned inconsistencies is not DICOM conform. As these kinds of inconsistencies cannot be recognized by the system, the IOD will not be rejected but the character data might not be displayed as intended.

7 Security

The syngo X-Workplace is supporting security by having the firewall of the underlying operating system active. Besides the standard ports of the operating system, only the DICOM Port (104) and the special port (15699) for incoming internal DynaCT transfers are opened.

Furthermore the syngo X-Workplace only accepts DICOM communication from other AE if the related System is configured with its hostname, port and AET.

8 Annexes

8.1 IOD Contents

8.1.1 Created SOP Instances

8.1.1.1 SC Standard Extended SOP Class

The syngo X-Workplace Workstation will create functional images from special applications. Those will be encoded as SC Standard extended SOP Class. Please see the following tables for a complete overview of supplied Type 1/2/3 Standard and Private attributes.

8.1.1.1.1 Composing Result Image

Table 57 - SC Derived Image (Monochrome) from Composing

Attribute Name	Tag	Value
Specific Character Set	(0008,0005)	(conf. Character Set is added, if needed)
Image Type	(0008,0008)	DERIVED\SECONDARY\\<algorithm>\<SW version> algorithm = SPINE or COLON or LLEG_ORTHO or LLEG_ANGIO or SPINE DLR or LLEG_ORTHO DLR or SPINE FD or LLEG_ORTHO FD or SPINE OSD or LLEG_ORTHO OSD
SOP Class UID	(0008,0016)	1.2.840.10008.5.1.4.1.1.7
SOP Instance UID	(0008,0018)	
Study Date	(0008,0020)	from Original[j]
Series Date	(0008,0021)	<yyyymmdd>
Acquisition Date	(0008,0022)	Derived from original Acquisition/Content Date or zero length
Content Date	(0008,0023)	<yyyymmdd>
Study Time	(0008,0030)	from Original
Series Time	(0008,0031)	<hhmmss>
Acquisition Time	(0008,0032)	Derived from original Acquisition/Content Time or zero length
Content Time	(0008,0033)	<hhmmss>
Accession Number	(0008,0050)	from Original
Modality	(0008,0060)	OT
Conversion Type	(0008,0064)	WSD
Manufacturer	(0008,0070)	Siemens
Institution Name	(0008,0080)	from WS Configuration
Institution Address	(0008,0081)	from WS Configuration
Referring Physician's Name	(0008,0090)	from Original
Station Name	(0008,1010)	from WS Configuration
Study Description	(0008,1030)	from Original
Series Description	(0008,103E)	(see [0008,0008] 3rd value <algorithm>)
Institutional Department Name	(0008,1040)	from WS configuration
Performing Physician's Name	(0008,1050)	input via "Correct" user interface possible
Admitting Diagnosis Description	(0008,1080)	from Original
Manufacturer's Model Name	(0008,1090)	syngoXWP
Derivation Description	(0008,2111)	<algorithm> (see [0008,0008])
Patient's Name	(0010,0010)	from Original
Patient ID	(0010,0020)	from Original
Patient's Birth Date	(0010,0030)	from Original

[j] "from Original" – only if existent in original image

Attribute Name	Tag	Value
Patient's Sex	(0010,0040)	from Original
Device Serial Number	(0018,1000)	from WS Configuration
Secondary Capture Device ID	(0018,1010)	from WS Configuration
Date of Secondary Capture	(0018,1012)	<yyyymmdd>
Time of Secondary Capture	(0018,1014)	<hhmmss>
Secondary Capture Device Manufacturer	(0018,1016)	Siemens
Secondary Capture Device Manufacturer's Model Name	(0018,1018)	LEONARDO
Secondary Capture Device Software Version	(0018,1019)	from WS Configuration
Software Version	(0018,1020)	from WS Configuration
Protocol Name	(0018,1030)	same as Series Description
Study Instance UID	(0020,000D)	from Original
Series Instance UID	(0020,000E)	
Study ID	(0020,0010)	from Original
Series Number	(0020,0011)	
Image Number	(0020,0013)	
Patient Orientation	(0020,0020)	zero length
Laterality	(0020,0060)	removed
Image Comments	(0020,4000)	
Samples per Pixel	(0028,0002)	1
Photometric Interpretation	(0028,0004)	MONOCHROME1 or MONOCHROME2
Rows	(0028,0010)	(defined by the number of original images used and the overlap by reconstruction algorithm)
Columns	(0028,0011)	from Original
Pixel Spacing	(0028,0030)	from Calibration, only for "stepping" images
Bits Allocated	(0028,0100)	from Original
Bits Stored	(0028,0101)	from Original
High Bit	(0028,0102)	from Original
Pixel Representation	(0028,0103)	0
Pixel Spacing Calibration Type	(0028,0A02)	only when (0028,0030) exists
Pixel Spacing Calibration Description	(0028,0A04)	only when (0028,0030) exists
Window Center	(0028,1050)	
Window Width	(0028,1051)	
Window Center & Width Explanation	(0028,1055)	
Study Comments	(0032,4000)	from Original
Overlay Rows	(60xx,0010)	
Overlay Columns	(60xx,0011)	
Overlay Description	(60xx,0022)	
Overlay Type	(60xx,0040)	G
Overlay Origin	(60xx,0050)	1\1
Overlay Bits Allocated	(60xx,0100)	same as (0028,0100) or 1 (if Overlay encoded in [60xx,3000])
Overlay Bit Position	(60xx,0102)	12 or 0 (if Overlay encoded in [60xx,3000])
Overlay Data	[60xx,3000]	Graphics Overlay
Pixel Data	(7FE0,0010)	

8.1.1.1.2 InSpace3D Projection Image Results

Table 58 - SC Derived Image (RGB) from InSpace3D Projections

Attribute Name	Tag	Value
Specific Character Set	(0008,0005)	from Original
Image Type	(0008,0008)	DERIVED\SECONDARY\OTHER\CSA 3D
SOP Class UID	(0008,0016)	1.2.840.10008.5.1.4.1.1.7
SOP Instance UID	(0008,0018)	

Attribute Name	Tag	Value
Study Date	(0008,0020)	from Original
Series Date	(0008,0021)	<yyyymmdd>
Content Date	(0008,0023)	<yyyymmdd>
Study Time	(0008,0030)	from Original
Series Time	(0008,0031)	<hhmmss>
Content Time	(0008,0033)	<hhmmss>
Accession Number	(0008,0050)	from Original
Modality	(0008,0060)	CT
Conversion Type	(0008,0064)	WSD
Manufacturer	(0008,0070)	“HipGraphics”
Institution Name	(0008,0080)	from WS Configuration
Institution Address	(0008,0081)	from WS Configuration
Referring Physician’s Name	(0008,0090)	from Original
Station Name	(0008,1010)	from WS Configuration
Study Description	(0008,1030)	from Original
Series Description	(0008,103E)	
Performing Physician’s Name	(0008,1050)	input via "Correct"
Manufacturer’s Model Name	(0008,1090)	“InSpace Postprocessing”
Patient’s Name	(0010,0010)	from Original
Patient ID	(0010,0020)	from Original
Patient’s Birth Date	(0010,0030)	from Original
Patient’s Sex	(0010,0040)	from Original
Patient’s Age	(0010,1010)	from Original
Device Serial Number	(0018,1000)	from WS Configuration
Secondary Capture Device ID	(0018,1010)	from WS Configuration
Date of Secondary Capture	(0018,1012)	<yyyymmdd>
Time of Secondary Capture	(0018,1014)	<hhmmss>
Secondary Capture Device Manufacturer	(0018,1016)	“HipGraphics”
Secondary Capture Device Manufacturer’s Model Name	(0018,1018)	“InSpace Postprocessing”
Secondary Capture Device Software Version	(0018,1019)	
Software Version	(0018,1020)	from WS Configuration
Study Instance UID	(0020,000D)	from Original
Series Instance UID	(0020,000E)	
Study ID	(0020,0010)	from Original
Series Number	(0020,0011)	from Original
Image Number	(0020,0013)	from Original
Patient Orientation	(0020,0020)	
Samples per Pixel	(0028,0002)	3
Photometric Interpretation	(0028,0004)	RGB
Planar Configuration	(0028,0006)	0
Rows	(0028,0010)	
Columns	(0028,0011)	
Bits Allocated	(0028,0100)	8
Bits Stored	(0028,0101)	8
High Bit	(0028,0102)	7
Pixel Representation	(0028,0103)	0
Pixel Data	(7FE0,0010)	

8.1.1.1.3 InSpace EP Segmentation Path Objects

Table 59 - SC Derived Image (RGB) from InSpace EP

Attribute Name	Tag	Value
Specific Character Set	(0008,0005)	from Original
Image Type	(0008,0008)	DERIVED\SECONDARY\INSPACE_EP_SEGM\<SW-Version> or DERIVED\SECONDARY\INSPACE_EP_PATH\<SW-Version>
SOP Class UID	(0008,0016)	1.2.840.10008.5.1.4.1.1.7
SOP Instance UID	(0008,0018)	1.3.12.2.1107.5.4.7.serialnumber.<individual_uid>
Study Date	(0008,0020)	from Original
Series Date	(0008,0021)	<yyyymmdd>
Acquisition Date	(0008,0022)	<yyyymmdd> (set from oldest acquisition or Content Date of input images, if available)
Content Date	(0008,0023)	<yyyymmdd>
Study Time	(0008,0030)	from Original
Series Time	(0008,0031)	<hhmmss>
Acquisition Time	(0008,0032)	<hhmmss> (set from oldest acquisition or Content Time of input images, if available)
Content Time	(0008,0033)	<hhmmss>
Accession Number	(0008,0050)	from Original
Modality	(0008,0060)	from Original
Conversion Type	(0008,0064)	WSD
Manufacturer	(0008,0070)	“Siemens”
Institution Name	(0008,0080)	from WS Configuration
Referring Physician’s Name	(0008,0090)	from Original
Station Name	(0008,1010)	from WS Configuration
Study Description	(0008,1030)	“3D Cardiac”
Procedure Code SQ	(0008,1032)	from Original
Series Description	(0008,103E)	can be set by user
Physicians of Records	(0008,1048)	from Original
Performing Physician’s Name	(0008,1050)	from Original, input via "Correct" user interface possible
Manufacturer’s Model Name	(0008,1090)	“LEONARDO”
Referenced Study SQ	(0008,1110)	from Original
Referenced Image SQ	(0008,1140)	Reference to Voxel Data (Image SOP Instances) used to derive and to be displayed with this segmentation
Related Series SQ	(0008,1250)	Series reference to Voxel data
Private Creator	(0009,xx10)	“SIEMENS AX INSPACE_EP”
Private Segmentation and Path Data	(0009,10xx)	Reference to Voxel Data
Patient’s Name	(0010,0010)	from Original
Patient ID	(0010,0020)	from Original
Patient’s Birth Date	(0010,0030)	from Original
Patient’s Sex	(0010,0040)	from Original
Patient’s Age	(0010,1010)	from Original
Private Creator	(0011,0010)	“BioPri3D”
Private Segmentation Data	(0011,10xx)	Segmentation data and results
Body Part Examined	(0018,0015)	“HEART”
Device Serial Number	(0018,1000)	from WS Configuration
Secondary Capture Device ID	(0018,1010)	from WS Configuration
Date of Secondary Capture	(0018,1012)	<yyyymmdd> (same as Content Date)
Time of Secondary Capture	(0018,1014)	<hhmmss> (same as Content Time)
Secondary Capture Device Manufacturer	(0018,1016)	“Siemens”
Secondary Capture Device Manufacturer’s Model Name	(0018,1018)	“LEONARDO”
Secondary Capture Device Software Version	(0018,1019)	from WS Configuration

Attribute Name	Tag	Value
Software Version	(0018,1020)	from WS Configuration
Patient Position	(0018,5100)	from Original
Private Creator	(0019,xx10)	“SIEMENS AX INSPACE_EP”
Private Path Data	(0019,10xx)	Private path list information
Study Instance UID	(0020,000D)	from Original
Series Instance UID	(0020,000E)	1.3.12.2.1107.5.4.7.serialnumber.<individual_uid>
Study ID	(0020,0010)	from Original
Series Number	(0020,0011)	next available series number, if stored into local database
Instance Number	(0020,0013)	always -1
Patient Orientation	(0020,0020)	<zero length>
Laterality	(0020,0060)	<removed>
Samples per Pixel	(0028,0002)	3
Photometric Interpretation	(0028,0004)	RGB
Planar Configuration	(0028,0006)	0 or 1
Rows	(0028,0010)	256
Columns	(0028,0011)	256
Bits Allocated	(0028,0100)	8
Bits Stored	(0028,0101)	8
High Bit	(0028,0102)	7
Pixel Representation	(0028,0103)	0
Window Center	(0028,1050)	128
Window Width	(0028,1051)	256
Scheduled Study Start Date	(0032,1000)	from Original
Scheduled Study Start Time	(0032,1001)	from Original
Scheduled Study Location	(0032,1020)	from Original
Scheduled Study Location AE Title(s)	(0032,1021)	from Original
Requesting Physician	(0032,1032)	from Original
Requested Procedure Description	(0032,1060)	from Original
Study Comments	(0032,4000)	from Original
Special Needs	(0038,0050)	from Original
Patient State	(0038,0500)	from Original
Request Attributes Sequence	(0040,0275)	from Original
> Attributes of ‘Request Attributes Sequence’		
Confidentiality Constraint on Patient Data Description	(0040,3001)	from Original
Private Creator	(0063,xx10)	“BioPri3D”
Private Segmentation Data	(0063,10xx)	Data according to DICOM proposal for Multi-Dimensional Interchange.
Pixel Data	(7FE0,0010)	Representative Icon Image of Segmentation result

8.1.1.1.4 Stored iFlow Images

Table 60 - SC Derived Image (RGB) from iFlow

Attribute Name	Tag	Value
Specific Character Set	(0008,0005)	from Original
Image Type	(0008,0008)	DERIVED\SECONDARY\SINGLE PLANE\SINGLE A\SECONDARY CAPTURE
SOP Class UID	(0008,0016)	1.2.840.10008.5.1.4.1.1.7
SOP Instance UID	(0008,0018)	1.3.12.2.1107.5.4.7.serialnumber.<individual_uid>
Study Date	(0008,0020)	from Original
Series Date	(0008,0021)	<yyyymmdd>
Acquisition Date	(0008,0022)	<yyyymmdd> (set from oldest acquisition or Content Date of input images, if available)
Content Date	(0008,0023)	<yyyymmdd>

Attribute Name	Tag	Value
Study Time	(0008,0030)	from Original
Series Time	(0008,0031)	<hhmmss>
Acquisition Time	(0008,0032)	<hhmmss> (set from oldest acquisition or image time of input images, if available)
Content Time	(0008,0033)	<hhmmss>
Accession Number	(0008,0050)	from Original
Modality	(0008,0060)	from Original
Conversion Type	(0008,0064)	WSD
Manufacturer	(0008,0070)	“Siemens”
Institution Name	(0008,0080)	from WS Configuration
Referring Physician’s Name	(0008,0090)	from Original
Station Name	(0008,1010)	from Original
Study Description	(0008,1030)	from Original
Procedure Code SQ	(0008,1032)	from Original
Series Description	(0008,103E)	from user input
Physicians of Records	(0008,1048)	from Original
Performing Physician’s Name	(0008,1050)	from Original
Manufacturer’s Model Name	(0008,1090)	from Original
Referenced Study SQ	(0008,1110)	from Original
Referenced Image SQ	(0008,1140)	Reference to Original (XA multi-frame)
Patient’s Name	(0010,0010)	from Original
Patient ID	(0010,0020)	from Original
Patient’s Birth Date	(0010,0030)	from Original
Patient’s Sex	(0010,0040)	from Original
Patient’s Age	(0010,1010)	from Original
Device Serial Number	(0018,1000)	from Original
Secondary Capture Device ID	(0018,1010)	from WS Configuration
Date of Secondary Capture	(0018,1012)	<yyyymmdd> (same as Content Date)
Time of Secondary Capture	(0018,1014)	<hhmmss> (same as Content Time)
Software Version	(0018,1020)	from Original
Protocol Name	(0018,1030)	from Original
Patient Position	(0018,5100)	from Original
Study Instance UID	(0020,000D)	from Original
Series Instance UID	(0020,000E)	1.3.12.2.1107.5.4.7.serialnumber.<individual_uid>
Study ID	(0020,0010)	from Original
Series Number	(0020,0011)	next available series number, if stored into local database
Instance Number	(0020,0013)	always "1"
Patient Orientation	(0020,0020)	from Original
Laterality	(0020,0060)	from Original
Samples per Pixel	(0028,0002)	3
Photometric Interpretation	(0028,0004)	RGB
Planar Configuration	(0028,0006)	0
Rows	(0028,0010)	1024
Columns	(0028,0011)	1024
Bits Allocated	(0028,0100)	8
Bits Stored	(0028,0101)	8
High Bit	(0028,0102)	7
Pixel Representation	(0028,0103)	0
Window Center	(0028,1050)	2047
Window Width	(0028,1051)	4095
Requesting Physician	(0032,1032)	from Original
Requested Procedure Description	(0032,1060)	from Original
Study Comments	(0032,4000)	from Original

Attribute Name	Tag	Value
Special Needs	(0038,0050)	from Original
Patient State	(0038,0500)	from Original
Performed Procedure Step Start Date	(0040,0244)	from Original
Performed Procedure Step Start Time	(0040,0245)	from Original
Performed Procedure Step Description	(0040,0254)	from Original
Request Attributes Sequence	(0040,0275)	from Original
> Attributes of 'Request Attributes Sequence'		
Confidentiality Constraint on Patient Data Description	(0040,3001)	from Original
Pixel Data	(7FE0,0010)	

8.1.1.2 XA Standard Extended SOP Class

The syngo X-Workplace will create "screen-shots" (Store Monitor images) from the Angio Viewer application. Those will be encoded as XA Standard extended SOP Class. The InSpace3D reconstruction package allows storing copies of the corrected input images. The Angio Viewer creates XRF images only, if this IOD type is base for viewing. Please see the following table for complete overview of supplied Type 1/2/3 Standard and Private attributes:

8.1.1.2.1 Angio Viewer "Store Monitor" Image

Table 61 - XA/XRF Derived Image (Monochrome) Store Monitor

Attribute Name	Tag	Value
Specific Character Set	(0008,0005)	(conf. Character Set is added, if needed)
Image Type	(0008,0008)	DERIVED\SECONDARY\SINGLE PLANE\SINGLE A(B)\STORE MONITOR
SOP Class UID	(0008,0016)	1.2.840.10008.5.1.4.1.1.12.1 or 1.2.840.10008.5.1.4.1.1.12.2
SOP Instance UID	(0008,0018)	
Study Date	(0008,0020)	from Original
Series Date	(0008,0021)	from Original
Acquisition Date	(0008,0022)	Derived from original Acquisition/Content Date or zero length
Content Date	(0008,0023)	<yyyymmdd> (date of creation)
Study Time	(0008,0030)	from Original
Series Time	(0008,0031)	from Original
Acquisition Time	(0008,0032)	Derived from original Acquisition/Content Time or zero length
Content Time	(0008,0033)	<hhmmss> (time of creation)
Accession Number	(0008,0050)	from Original
Modality	(0008,0060)	XA
Manufacturer	(0008,0070)	Siemens
Institution Name	(0008,0080)	from Original
Institution Address	(0008,0081)	from Original
Referring Physician's Name	(0008,0090)	from Original
Station Name	(0008,1010)	from Original
Study Description	(0008,1030)	from Original
Series Description	(0008,103E)	from Original
Institutional Department Name	(0008,1040)	from Original
Performing Physician's Name	(0008,1050)	input via "Correct" user interface possible
Admitting Diagnosis Description	(0008,1080)	from Original
Manufacturer's Model Name	(0008,1090)	from Original
Patient's Name	(0010,0010)	from Original
Patient ID	(0010,0020)	from Original
Patient's Birth Date	(0010,0030)	from Original

Attribute Name	Tag	Value
Patient's Sex	(0010,0040)	from Original
Patient's Age	(0010,1010)	from Original
Patient's Size	(0010,1020)	from Original
Patient's Weight	(0010,1030)	from Original
Patient Comments	(0010,4000)	from Original
Contrast Bolus Agent	(0018,0010)	from Original
KVP	(0018,0060)	from Original
Device Serial Number	(0018,1000)	from Original
Software Version	(0018,1020)	from Original
Protocol Name	(0018,1030)	from Original
Contrast/Bolus Ingredient	(0018,1048)	from Original
Distance Source to Detector	(0018,1110)	from Original
Distance Source to Patient	(0018,1111)	from Original
Estimated Radiographic Magnification Factor	(0018,1114)	from Original
Exposure Time	(0018,1150)	from Original
X-Ray Tube Current	(0018,1151)	from Original
Average Pulse Width	(0018,1154)	from Original
Radiation Setting	(0018,1155)	from Original
Radiation Mode	(0018,115A)	from Original
Image Area Dose Product	(0018,115E)	from Original
Intensifier Size	(0018,1162)	from Original
Imager Pixel Spacing	(0018,1164)	from Original
Grid	(0018,1166)	from Original
Column Angulation	(0018,1450)	from Original (XRF image only)
Tomo Layer Height	(0018,1460)	from Original (XRF image only)
Tomo Angle	(0018,1470)	from Original (XRF image only)
Tomo Time	(0018,1480)	from Original (XRF image only)
Positioner Motion	(0018,1500)	from Original (XA image only)
Positioner Primary Angle	(0018,1510)	from Original (XA image only)
Positioner Secondary Angle	(0018,1511)	from Original (XA image only)
Detector Primary Angle	(0018,1530)	from Original (XA image only)
Detector Secondary Angle	(0018,1531)	from Original (XA image only)
Shutter Shape	(0018,1600)	
Shutter Left Vertical Edge	(0018,1602)	as set
Shutter Right Vertical Edge	(0018,1604)	as set
Shutter Upper Horizontal Edge	(0018,1606)	as set
Shutter Lower Horizontal Edge	(0018,1608)	as set
Center of Circular Shutter	(0018,1610)	from Original
Radius of Circular Shutter	(0018,1612)	from Original
Collimator Shape	(0018,1700)	from Original
Collimator Left Vertical Edge	(0018,1702)	from Original
Collimator Right Vertical Edge	(0018,1704)	from Original
Collimator Upper Horizontal Edge	(0018,1706)	from Original
Collimator Lower Horizontal Edge	(0018,1708)	from Original
Center of Circular Collimator	(0018,1710)	from Original
Radius of Circular Collimator	(0018,1712)	from Original
Vertices of the Polygonal Collimator	(0018,1720)	from Original
Private Creator	(0019,00xx)	SIEMENS SMS-AX VIEW 1.0
Review Mode	(0019,xx00)	if existent in Original (Siemens AXIOM system)
Anatomical Background Percent	(0019,xx01)	as set
Number of Phases	(0019,xx02)	if existent in Original (Siemens AXIOM system)
Apply Anatomical Background	(0019,xx03)	as set
Pixel Shift Array	(0019,xx04)	as set

Attribute Name	Tag	Value
Brightness	(0019,xx05)	as set
Contrast	(0019,xx06)	as set
Enabled Shutters	(0019,xx07)	as set
Native Edge Enhancement Percent Gain	(0019,xx08)	as set
Native Edge Enhancement LUT Index	(0019,xx09)	as set
Native Edge Enhancement Kernel Size	(0019,xx0A)	as set
Subtracted Edge Enhancement Percent Gain	(0019,xx0B)	as set
Subtracted Edge Enhancement LUT Index	(0019,xx0C)	as set
Subtracted Edge Enhancement Kernel Size	(0019,xx0D)	as set
Fade Percent	(0019,xx0E)	as set
Flipped before Laterality applied	(0019,xx0F)	
Apply Fade	(0019,xx10)	as set
RefImages Taken	(0019,xx11)	as set
Zoom	(0019,xx12)	as set
Pan X	(0019,xx13)	as set
Pan Y	(0019,xx14)	as set
Native Edge Enhancement Adverse Percent Gain	(0019,xx15)	as set
Subtracted Edge Enhancement Adverse Percent Gain	(0019,xx16)	as set
Study Instance UID	(0020,000D)	from Original
Series Instance UID	(0020,000E)	from Original
Study ID	(0020,0010)	from Original
Series Number	(0020,0011)	from Original
Acquisition Number	(0020,0012)	from Original
Image Number	(0020,0013)	
Patient Orientation	(0020,0020)	from Original or zero length
Image Comments	(0020,4000)	SM
Samples per Pixel	(0028,0002)	1
Photometric Interpretation	(0028,0004)	MONOCHROME2
Rows	(0028,0010)	from Original
Columns	(0028,0011)	from Original
Bits Allocated	(0028,0100)	from Original
Bits Stored	(0028,0101)	from Original
High Bit	(0028,0102)	from Original
Pixel Representation	(0028,0103)	0
Pixel Intensity Relationship	(0028,1040)	DISP
Window Center	(0028,1050)	as set
Window Width	(0028,1051)	as set
Representative Frame Number	(0028,6010)	1
Requested Procedure Description	(0032,1060)	from Original
Study Comments	(0032,4000)	from Original
Performed Procedure Step Start Date	(0040,0244)	from Original
Performed Procedure Step Start Time	(0040,0245)	from Original
Performed Procedure Step ID	(0040,0235)	from Original
Request Attributes Sequence	(0040,0275)	from Original
> item contents as provided		*from Original*
Overlay Rows	(60xx,0010)	
Overlay Columns	(60xx,0011)	
Overlay Description	(60xx,0022)	
Overlay Type	(60xx,0040)	G
Overlay Origin	(60xx,0050)	1\1
Overlay Bits Allocated	(60xx,0100)	same as (0028,0100) or 1 (if Overlay encoded in [60xx,3000])
Overlay Bit Position	(60xx,0102)	12 or 0 (if Overlay encoded in [60xx,3000])

Attribute Name	Tag	Value
Overlay Data	[60xx,3000]	(with Offline Media Instances) Graphics Overlay
Pixel Data	(7FE0,0010)	

8.1.1.2.2 InSpace3D Corrected Input Images

Table 62 - XA Derived Image (Monochrome) InSpace3D Corrected Input

Attribute Name	Tag	Value
Specific Character Set	(0008,0005)	From Original or conf. Character Set
Image Type	(0008,0008)	DERIVED\SECONDARY\SINGLE PLANE\CORRECTED
SOP Class UID	(0008,0016)	1.2.840.10008.5.1.4.1.1.2
SOP Instance UID	(0008,0018)	<new UID>
Study Date	(0008,0020)	from Original
Series Date	(0008,0021)	<yyyymmdd> (date of creation)
Acquisition Date	(0008,0022)	Derived from original Acquisition/Content Date or zero length
Content Date	(0008,0023)	<yyyymmdd> (date of creation)
Study Time	(0008,0030)	from Original
Series Time	(0008,0031)	<hhmmss> (time of creation)
Acquisition Time	(0008,0032)	Derived from original Acquisition/Content Time or zero length
Content Time	(0008,0033)	<hhmmss> (time of creation)
Accession Number	(0008,0050)	from Original
Modality	(0008,0060)	OT
Manufacturer	(0008,0070)	Siemens
Institution Name	(0008,0080)	from WS Configuration
Institution Address	(0008,0081)	from WS Configuration
Referring Physician's Name	(0008,0090)	from Original
Station Name	(0008,1010)	from WS Configuration
Study Description	(0008,1030)	from Original
Series Description	(0008,103E)	"Images for VOI selection"
Institutional Department Name	(0008,1040)	from WS Configuration
Performing Physician's Name	(0008,1050)	from Original
Admitting Diagnosis Description	(0008,1080)	from Original
Manufacturer's Model Name	(0008,1090)	from Original
Derivation Description	(0008,2111)	from Original
Patient's Name	(0010,0010)	from Original
Patient ID	(0010,0020)	from Original
Patient's Birth Date	(0010,0030)	from Original
Patient's Sex	(0010,0040)	from Original
Patient's Age	(0010,1010)	from Original
Patient's Size	(0010,1020)	from Original
Patient's Weight	(0010,1030)	from Original
Patient Comments	(0010,4000)	from Original
Contrast Bolus Agent	(0018,0010)	from Original
KVP	(0018,0060)	from Original
Device Serial Number	(0018,1000)	from Original
Software Version	(0018,1020)	from Original + "\<WS version>"
Protocol Name	(0018,1030)	from Original
Contrast Bolus Ingredient	(0018,1048)	from Original
Distance Source to Detector	(0018,1110)	from Original
Distance Source to Patient	(0018,1111)	from Original
Estimated Radiographic Magnification Factor	(0018,1114)	from Original
Exposure Time	(0018,1150)	from Original

Attribute Name	Tag	Value
X-Ray Tube Current	(0018,1151)	from Original
Average Pulse Width	(0018,1154)	from Original
Radiation Setting	(0018,1155)	from Original
Radiation Mode	(0018,115A)	from Original
Image Area Dose Product	(0018,115E)	from Original
Intensifier Size	(0018,1162)	from Original
Imager Pixel Spacing	(0018,1164)	from Original
Date of last Calibration	(0018,1200)	<yyyymmdd>
Positioner Motion	(0018,1500)	
Positioner Primary Angle	(0018,1510)	extracted from Original image data-set
Positioner Secondary Angle	(0018,1511)	extracted from Original image data-set
Detector Primary Angle	(0018,1530)	from Original
Detector Secondary Angle	(0018,1531)	from Original
Shutter Shape	*(0018,1600)*	*removed, if present in Original*
Shutter Left Vertical Edge	*(0018,1602)*	*removed, if present in Original*
Shutter Right Vertical Edge	*(0018,1604)*	*removed, if present in Original*
Shutter Upper Horizontal Edge	*(0018,1606)*	*removed, if present in Original*
Shutter Lower Horizontal Edge	*(0018,1608)*	*removed, if present in Original*
Center of Circular Shutter	*(0018,1610)*	*removed, if present in Original*
Radius of Circular Shutter	*(0018,1612)*	*removed, if present in Original*
Collimator Shape	*(0018,1700)*	*removed, if present in Original*
Collimator Left Vertical Edge	*(0018,1702)*	*removed, if present in Original*
Collimator Right Vertical Edge	*(0018,1704)*	*removed, if present in Original*
Collimator Upper Horizontal Edge	*(0018,1706)*	*removed, if present in Original*
Collimator Lower Horizontal Edge	*(0018,1708)*	*removed, if present in Original*
Center of Circular Collimator	*(0018,1710)*	*removed, if present in Original*
Radius of Circular Collimator	*(0018,1712)*	*removed, if present in Original*
Vertices of the Polygonal Collimator	*(0018,1720)*	*removed, if present in Original*
Study Instance UID	(0020,000D)	from Original
Series Instance UID	(0020,000E)	<new UID>
Study ID	(0020,0010)	from Original
Series Number	(0020,0011)	
Acquisition Number	(0020,0012)	from Original
Image Number	(0020,0013)	frame number from original multi-frame image
Patient Orientation	(0020,0020)	removed
Laterality	(0020,0060)	from Original
Images in Acquisition	(0020,1002)	removed
Image Comments	(0020,4000)	from Original
Samples per Pixel	(0028,0002)	1
Photometric Interpretation	(0028,0004)	MONOCHROME2
Rows	(0028,0010)	from Original
Columns	(0028,0011)	from Original
Bits Allocated	(0028,0100)	from Original
Bits Stored	(0028,0101)	from Original
High Bit	(0028,0102)	from Original
Pixel Representation	(0028,0103)	0
Pixel Intensity Relationship	(0028,1040)	LIN
Window Center	(0028,1050)	
Window Width	(0028,1051)	
Recommended Viewing Mode	(0028,1090)	NAT
Representative Frame Number	(0028,6010)	1
Requested Procedure Description	(0032,1060)	from Original
Study Comments	(0032,4000)	from Original

Attribute Name	Tag	Value
Performed Procedure Step Start Date	(0040,0244)	from Original
Performed Procedure Step Start Time	(0040,0245)	from Original
Performed Procedure Step ID	(0040,0235)	from Original
Request Attributes Sequence	(0040,0275)	from Original
> *item contents as provided*		from Original
Overlay Rows	(60xx,0010)	
Overlay Columns	(60xx,0011)	
Overlay Description	(60xx,0022)	
Overlay Type	(60xx,0040)	G
Overlay Origin	(60xx,0050)	1\1
Overlay Bits Allocated	(60xx,0100)	same as (0028,0100) or 1 (if Overlay encoded in [60xx,3000])
Overlay Bit Position	(60xx,0102)	12 or 0 (if Overlay encoded in [60xx,3000])
Overlay Data	[60xx,3000]	(with Offline Media Instances) Graphics Overlay
Pixel Data	(7FE0,0010)	

8.1.1.2.3 Quant Report Images - Derived XA/XRF IOD

The syngo X-Workplace will create result images from performing Quantitative Analysis Functions. To ensure image interchange, the resulting reports are of same type as the input images – XA or XRF.

Table 63 - XA/XRF Derived Quant Report Image (Monochrome)

Attribute Name	Tag	Value
Specific Character Set	(0008,0005)	(conf. Character Set is added, if needed)
Image Type	(0008,0008)	DERIVED\SECONDARY\<3rd to nth value from Original>\QUANT
SOP Class UID	(0008,0016)	1.2.840.10008.5.1.4.1.1.12.1 or 1.2.840.10008.5.1.4.1.1.12.2
SOP Instance UID	(0008,0018)	
Study Date	(0008,0020)	from Original
Series Date	(0008,0021)	<yyyymmdd> (Quant Series)
Acquisition Date	(0008,0022)	Date of original Acquisition
Content Date	(0008,0023)	<yyyymmdd> (date of creation)
Study Time	(0008,0030)	from Original
Series Time	(0008,0031)	<hhmmss> (Quant Series)
Acquisition Time	(0008,0032)	Time original Acquisition
Content Time	(0008,0033)	<hhmmss> (time of creation)
Accession Number	(0008,0050)	from Original
Modality	(0008,0060)	XA or RF
Manufacturer	(0008,0070)	Siemens
Institution Name	(0008,0080)	from Original
Referring Physician's Name	(0008,0090)	from Original
Station Name	(0008,1010)	from WS configuration
Study Description	(0008,1030)	from Original
Series Description	(0008,103E)	input from Analysis
Performing Physician's Name	(0008,1050)	input via "Correct" user interface possible
Operator's Name	(0008,1070)	from Original
Admitting Diagnosis Description	(0008,1080)	from Original
Manufacturer's Model Name	(0008,1090)	
Referenced Patient Sequence	(0008,1120)	from Original
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	
Start Trim	(0008,2142)	<1st frame to display>

Attribute Name	Tag	Value
Stop Trim	(0008,2143)	<last frame to display>
Recommended Display Frame Rate	(0008,2144)	1
Patient's Name	(0010,0010)	from Original
Patient ID	(0010,0020)	from Original
Patient's Birth Date	(0010,0030)	from Original
Patient's Sex	(0010,0040)	from Original
Patient's Age	(0010,1010)	from Original
Patient's Size	(0010,1020)	as entered (in meter)
Patient's Weight	(0010,1030)	as entered (in kilogram)
Medical Alerts	(0010,2000)	from Original
Contrast Allergies	(0010,2110)	from Original
Pregnancy Status	(0010,21C0)	from Original
Patient Comments	(0010,4000)	from Original
Contrast Bolus Agent	(0018,0010)	from Original
Cine Rate	(0018,0040)	1
KVP	(0018,0060)	from Original
Device Serial Number	(0018,1000)	from WS configuration
Software Version	(0018,1020)	
Protocol Name	(0018,1030)	from Original
Contrast/Bolus Ingredient	(0018,1048)	from Original
Frame Time	(0018,1063)	1000
Distance Source to Detector	(0018,1110)	from Original
Distance Source to Patient	(0018,1111)	from Original
Exposure Time	(0018,1150)	from Original
X-Ray Tube Current	(0018,1151)	from Original
Average Pulse Width	(0018,1154)	from Original
Radiation Setting	(0018,1155)	from Original
Radiation Mode	(0018,115A)	from Original
Image Area Dose Product	(0018,115E)	from Original
Intensifier Size	(0018,1162)	from Original
Focal Spot	(0018,1190)	from Original
Column Angulation	(0018,1450)	from Original (XRF)
Tomo Layer Height	(0018,1460)	from Original (XRF)
Tomo Angle	(0018,1470)	from Original (XRF)
Tomo Time	(0018,1480)	from Original (XRF)
Tomo Type	(0018,1490)	from Original (XRF)
Positioner Motion	(0018,1500)	from Original (XA)
Positioner Primary Angle	(0018,1510)	from Original (XA)
Positioner Secondary Angle	(0018,1511)	from Original (XA)
Positioner Primary Angle Increment	(0018,1520)	from Original (XA, Only with DYNAMIC)
Positioner Secondary Angle Increment	(0018,1521)	from Original (XA, Only with DYNAMIC)
Patient Position	(0018,5100)	from Original
Study Instance UID	(0020,000D)	from Original
Series Instance UID	(0020,000E)	<new Quant series will be created>
Study ID	(0020,0010)	from Original
Series Number	(0020,0011)	
Acquisition Number	(0020,0012)	from Original
Image Number	(0020,0013)	
Patient Orientation	(0020,0020)	from Original or zero length
Private Creator	(0023,00xx)	SIEMENS SMS-AX QUANT 1.0
Attributes according to "A.2.6 Angio Quantification Module" if image was calibrated		
Samples per Pixel	(0028,0002)	1
Photometric Interpretation	(0028,0004)	MONOCHROME2

Attribute Name	Tag	Value
Number of Frames	(0028,0008)	1 to 4
Frame Increment Pointer	(0028,0009)	(0018,1063)
Rows	(0028,0010)	1024
Columns	(0028,0011)	1024
Bits Allocated	(0028,0100)	16
Bits Stored	(0028,0101)	12
High Bit	(0028,0102)	11
Pixel Representation	(0028,0103)	0
Pixel Intensity Relationship	(0028,1040)	LIN
Window Center	(0028,1050)	2047
Window Width	(0028,1051)	4095
Lossy Image Compression	(0028,2110)	from Original
Representative Frame Number	(0028,6010)	1
Study Status ID	(0032,000A)	from Original
Scheduled Study Start Date	(0032,1000)	from Original
Scheduled Study Start Time	(0032,1001)	from Original
Scheduled Study Location	(0032,1020)	from Original
Scheduled Study Location AE Title	(0032,1021)	from Original
Requesting Physician	(0032,1032)	from Original
Requested Procedure Description	(0032,1060)	from Original
Requested Contrast Agent	(0032,1060)	from Original
Study Comments	(0032,4000)	from Original
Performed Procedure Step Start Date	(0040,0244)	from Original
Performed Procedure Step Start Time	(0040,0245)	from Original
Performed Procedure Step ID	(0040,0235)	from Original
Request Attributes Sequence	(0040,0275)	from Original
> *item contents as provided*		*from Original*
Confidentiality Constraint on Patient Data Description	[0040,3001]	from Original
Pixel Data	(7FE0,0010)	

8.1.1.2.4 iPilot 3D Reference Image

The iPilot application creates an XA Image to contain the 3D calculated reference for use in the imaging modality. The content is only useful in this context and therefore the DICOM content is "tailored" for this special use. It can be identified with the help of the following attributes:

(0008,0008) Image Type is set to "DERIVED\SECONDARY\SINGLE PLANE\SINGLE A\REFIMAGE\3D REF"

(0008,0016) SOP Class UID is set to "1.2.840.10008.5.1.4.1.1.12.1"

(0008,103E) Series Description is pre-set to "Series for iPilot Reference Images"

8.1.1.3 CT Standard Extended SOP Class

8.1.1.3.1 DynaCT Reconstructed Volume Data

The syngo X-Workplace will create 3D volume data-sets from InSpace3D and DynaCT application package. Those will be encoded as CT Standard extended SOP Class. Please see the following table for complete overview of supplied Type 1/2/3 Standard and Private attributes:

Table 64 - CT Derived Image (Monochrome) from InSpace3D & DynaCT Reconstruction

Attribute Name	Tag	Value
Specific Character Set	(0008,0005)	From Original or conf. Character Set
Image Type	(0008,0008)	DERIVED\SECONDARY\AXIAL\3DANGIO\<Data_Type> <Data_Type> values: NAT_MASK Images acquired w/o contrast media NAT_FILL Images acquired with contrast media SUB Subtracted acquisition PBV "Parenchymal Blood Volume" acq.
SOP Class UID	(0008,0016)	1.2.840.10008.5.1.4.1.1.2 (CT Image Storage)
SOP Instance UID	(0008,0018)	<new UID>
Study Date	(0008,0020)	from Original
Series Date	(0008,0021)	<yyyymmdd> (date of creation)
Acquisition Date	(0008,0022)	Derived from original Acquisition/Content Date
Content Date	(0008,0023)	<yyyymmdd> (date of creation)
Study Time	(0008,0030)	from Original
Series Time	(0008,0031)	<hhmmss> (time of creation)
Acquisition Time	(0008,0032)	Derived from original Acquisition/Content Time
Content Time	(0008,0033)	<hhmmss> (time of creation)
Accession Number	(0008,0050)	from Original
Modality	(0008,0060)	XA or CT (default = XA, can be configured)
Manufacturer	(0008,0070)	Siemens
Institution Name	(0008,0080)	from WS Configuration
Institution Address	(0008,0081)	from WS Configuration
Referring Physician's Name	(0008,0090)	from Original
Station Name	(0008,1010)	from WS Configuration
Study Description	(0008,1030)	from Original
Series Description	(0008,103E)	set by application
Institutional Department Name	(0008,1040)	from WS Configuration
Performing Physician's Name	(0008,1050)	from Original
Admitting Diagnosis Description	(0008,1080)	from Original
Manufacturer's Model Name	(0008,1090)	"AXIOM-Artis"
Derivation Description	(0008,2111)	Code for applied correction algorithms
Patient's Name	(0010,0010)	from Original
Patient ID	(0010,0020)	from Original
Patient's Birth Date	(0010,0030)	from Original
Patient's Sex	(0010,0040)	from Original
Patient's Age	(0010,1010)	from Original
Patient's Size	(0010,1020)	from Original
Patient's Weight	(0010,1030)	from Original
Patient Comments	(0010,4000)	from Original
Other patient demographic attributes from group 0010 may be copied "from original", if present there.		
Slice Thickness	(0018,0050)	Set according to Pixel Spacing for cubic voxels
KVP	(0018,0060)	from Original
Device Serial Number	(0018,1000)	from Original
Software Version	(0018,1020)	from Original + "\<WS version>"
Protocol Name	(0018,1030)	from Original+<zoom size(nnn)>+<step width(n.nn)>+<dose(nn.nn)>+<correction(aaa)>

Attribute Name	Tag	Value
Reconstruction Diameter	(0018,1100)	set for reconstructed slice
Distance Source to Detector	(0018,1110)	from Original
Distance Source to Patient	(0018,1111)	from Original
Exposure Time	(0018,1150)	from Original
X-Ray Tube Current	(0018,1151)	from Original
Date of last Calibration	(0018,1200)	<yyyymmdd>
Convolution Kernel	(0018,1210)	<kernel type>\<Image characteristics> Values for kernel type: "EE" (Default for high contrast) "HU" (Default for DynaCT) Values for image characteristics: "Auto", "Sharp", "Normal", "Smooth", "Very Smooth"
Patient Position	(0018,5100)	from Original
Private Creator	(0019,00xx)	“SIEMENS AX DYNACT”
Private Data	(0019,xx02)	private transformation matrix
Study Instance UID	(0020,000D)	from Original
Series Instance UID	(0020,000E)	<new UID>
Study ID	(0020,0010)	from Original
Series Number	(0020,0011)	
Acquisition Number	(0020,0012)	from Original
Image Number	(0020,0013)	
Patient Orientation	(0020,0020)	removed
Image Position (Patient)	(0020,0032)	calculated during reconstruction
Image Orientation (Patient)	(0020,0037)	calculated during reconstruction
Frame of Reference UID	(0020,0052)	<new UID> (per reconstructed image-set)
Laterality	(0020,0060)	from Original
Position Reference Indicator	(0020,1040)	
Private Creator	(0021,00xx)	“SIEMENS SMS-AX ACQ 1.0”
Private Acquisition Data	(0021,xxxx)	private acquisition data
Samples per Pixel	(0028,0002)	1
Photometric Interpretation	(0028,0004)	MONOCHROME2
Rows	(0028,0010)	128 or 256 or 512
Columns	(0028,0011)	128 or 256 or 512
Pixel Spacing	(0028,0030)	calculated during reconstruction
Bits Allocated	(0028,0100)	16
Bits Stored	(0028,0101)	16
High Bit	(0028,0102)	15
Pixel Representation	(0028,0103)	0
Window Center	(0028,1050)	Value from the "visualization Preset" configuration
Window Width	(0028,1051)	Value from the "visualization Preset" configuration
Rescale Intercept	(0028,1052)	0
Rescale Slope	(0028,1053)	1
Rescale Type	(0028,1054)	"HU" if filter kernel was HU "US" if filter kernel was EE
Requested Procedure Description	(0032,1060)	from Original
Study Comments	(0032,4000)	from Original
Special Needs	(0038,0050)	from Original
Patient State	(0038,0500)	from Original
Performed Procedure Step Start Date	(0040,0244)	from Original
Performed Procedure Step Start Time	(0040,0245)	from Original
Performed Procedure Step ID	(0040,0235)	from Original
Request Attributes Sequence	(0040,0275)	from Original
> item contents as provided		*from Original*
Confidentiality Constraint on Patient Data Description	[0040,3001]	from Original
Pixel Data	(7FE0,0010)	

8.1.1.4 SR Document SOP Class

The syngo X-Workplace will create Reports on demand for long-term follow-up of scoliosis analysis. Since there is no public template for orthopedic reports available for this, a Siemens privately defined template for long-term documentation is used. Please refer to next sections to learn about the SR implementation and the definition of the underlying SR template.

8.1.1.4.1 Orthopedic Report Comprehensive SR SOP Class

Table 65 - (Private) Orthopedic Report Comprehensive SR from Composing

Attribute Name	Tag	Value
Specific Character Set	(0008,0005)	(conf. Character Set is added, if needed)
Image Type	(0008,0008)	ORIGINAL\PRIMARY\OTHER\CSA_REPORT
SOP Class UID	(0008,0016)	1.2.840.10008.5.1.4.1.1.88.33
SOP Instance UID	(0008,0018)	
Study Date	(0008,0020)	from Original
Series Date	(0008,0021)	<yyyymmdd>
Content Date	(0008,0023)	<yyyymmdd>
Study Time	(0008,0030)	from Original
Series Time	(0008,0031)	<hhmmss>
Content Time	(0008,0033)	<hhmmss>
Accession Number	(0008,0050)	from Original
Modality	(0008,0060)	SR
Manufacturer	(0008,0070)	Siemens
Institution Name	(0008,0080)	from WS Configuration
Institution Address	(0008,0081)	from WS Configuration
Referring Physician's Name	(0008,0090)	from Original
Station Name	(0008,1010)	from WS Configuration
Study Description	(0008,1030)	from Original
Series Description	(0008,103E)	"Composing Report"
Institutional Department Name	(0008,1040)	from WS configuration
Performing Physician's Name	(0008,1050)	input via "Correct" user interface possible
Admitting Diagnosis Description	(0008,1080)	from Original
Manufacturer's Model Name	(0008,1090)	from WS configuration
Patient's Name	(0010,0010)	from Original
Patient ID	(0010,0020)	from Original
Patient's Birth Date	(0010,0030)	from Original
Patient's Sex	(0010,0040)	from Original
Device Serial Number	(0018,1000)	from WS Configuration
Software Version	(0018,1020)	from WS Configuration
Study Instance UID	(0020,000D)	from Original
Series Instance UID	(0020,000E)	
Study ID	(0020,0010)	from Original
Series Number	(0020,0011)	
Instance Number	(0020,0013)	
Study Status ID	(0032,000A)	from Original
Scheduled Study Start Date	(0032,1000)	from Original
Scheduled Study Start Time	(0032,1001)	from Original
Scheduled Study Location	(0032,1020)	from Original
Scheduled Study Location AE Title	(0032,1021)	from Original
Requesting Physician	(0032,1032)	from Original
Requested Procedure Description	(0032,1060)	from Original

Attribute Name	Tag	Value
Study Comments	(0032,4000)	from Original
	(0040,A040)	CONTAINER
Concept Name Code SQ	(0040,A043)	
>Code Value	(0008,0100)	“ORx50001”
>Coding Scheme Designator	(0008,0102)	“99SMS_COMP”
>Code Value	(0008,0104)	“Orthopedic Report”
Continuity of Contents	(0040,A050)	“SEPARATE”
Performed Procedure Code SQ	(0040,A372)	
Current Requested Procedure Evidence SQ	(0040,A375)	
> sequence items		This sequence will contain references to each image referenced in the report.
Completion Flag	(0040,A491)	
Verification Flag	(0040,A493)	
Content Template SQ	(0040,A504)	See Template Descriptions in section “8.3 Coded Terminology and Templates” for further details on the Orthopedic Report Template.
Content SQ	(0040,A730)	

8.1.2 Usage of Attributes from Received IODs

Please refer to the “SOP-specific conformance…” sections in the DICOM networking part of this DCS for more details on attribute specific handling.

8.1.3 Attribute Mapping

The syngo X-Workplace is not an Acquisition modality that maps schedules to performed procedures. The mapping of attributes for derived SOP Instances is disclosed in the tables of the previous sub-sections of “8.1.1 Created SOP Instances”.

8.1.4 Coerced/Modified Fields

The syngo X-Workplace DICOM Application is not performing data coercion.

8.2 Data Dictionary of Private Attributes

Table 66 - Data Dictionary of Private Attributes

Tag	Private Owner Code	Name	VR	VM
(0019,xx00)	SIEMENS SMS-AX VIEW 1.0	Review Mode	US	1
(0019,xx01)	SIEMENS SMS-AX VIEW 1.0	Anatomical Background Percent	US	1
(0019,xx02)	SIEMENS SMS-AX VIEW 1.0	Number of Phases	US	1
(0019,xx03)	SIEMENS SMS-AX VIEW 1.0	Apply Anatomical Background	US	1
(0019,xx04)	SIEMENS SMS-AX VIEW 1.0	Pixel Shift Array	SS	4-4n
(0019,xx05)	SIEMENS SMS-AX VIEW 1.0	Brightness	US	1
(0019,xx06)	SIEMENS SMS-AX VIEW 1.0	Contrast	US	1
(0019,xx07)	SIEMENS SMS-AX VIEW 1.0	Enabled Shutters	US	1
(0019,xx08)	SIEMENS SMS-AX VIEW 1.0	Native Edge Enh. Percent Gain	US	1
(0019,xx09)	SIEMENS SMS-AX VIEW 1.0	Native Edge Enh. LUT Index	SS	1
(0019,xx0A)	SIEMENS SMS-AX VIEW 1.0	Native Edge Enh. Kernel Size	SS	1
(0019,xx0B)	SIEMENS SMS-AX VIEW 1.0	Subtr. Edge Enh. Percent Gain	US	1
(0019,xx0C)	SIEMENS SMS-AX VIEW 1.0	Subtr. Edge Enh. LUT Index	SS	1
(0019,xx0D)	SIEMENS SMS-AX VIEW 1.0	Subtr. Edge Enh. Kernel Size	SS	1
(0019,xx0E)	SIEMENS SMS-AX VIEW 1.0	Fade Percent	US	1
(0019,xx0F)	SIEMENS SMS-AX VIEW 1.0	Flipped before Laterality Applied	US	1
(0019,xx10)	SIEMENS SMS-AX VIEW 1.0	Apply Fade	US	1
(0019,xx11)	SIEMENS SMS-AX VIEW 1.0	RefImages Taken	US	1
(0019,xx12)	SIEMENS SMS-AX VIEW 1.0	Zoom	US	1
(0019,xx13)	SIEMENS SMS-AX VIEW 1.0	Pan X	SS	1
(0019,xx14)	SIEMENS SMS-AX VIEW 1.0	Pan Y	SS	1
(0019,xx15)	SIEMENS SMS-AX VIEW 1.0	Native Edge Enh. Adv Percent Gain	SS	1
(0019,xx16)	SIEMENS SMS-AX VIEW 1.0	Subtr. Edge Enh. Adv Percent Gain	SS	1
(0023,xx00)	SIEMENS SMS-AX QUANT 1.0	Horizontal Calibration Pixel Size	DS	2
(0023,xx01)	SIEMENS SMS-AX QUANT 1.0	Vertical Calibration Pixel Size	DS	2
(0023,xx02)	SIEMENS SMS-AX QUANT 1.0	Calibration Object	LO	1
(0023,xx03)	SIEMENS SMS-AX QUANT 1.0	Calibration Object Size	DS	1
(0023,xx04)	SIEMENS SMS-AX QUANT 1.0	Calibration Method	LO	1
(0023,xx05)	SIEMENS SMS-AX QUANT 1.0	Filename	ST	1
(0023,xx06)	SIEMENS SMS-AX QUANT 1.0	Frame Number	IS	1
(0023,xx07)	SIEMENS SMS-AX QUANT 1.0	Calibration Factor Multiplicity	IS	2
(0029,xx08)	SIEMENS CSA NON-IMAGE	CSA Data Type	CS	1
(0029,xx09)	SIEMENS CSA NON-IMAGE	CSA Data Version	LO	1
(0029,xx10)	SIEMENS CSA NON-IMAGE	CSA Data Info	OB	1
(0029,xx08)	SIEMENS CSA HEADER	CSA Image Header Type	CS	1
(0029,xx09)	SIEMENS CSA HEADER	CSA Image Header Version	LO	1
(0029,xx10)	SIEMENS CSA HEADER	CSA Image Header Info	OB	1
(0029,xx18)	SIEMENS CSA HEADER	CSA Series Header Type	CS	1
(0029,xx19)	SIEMENS CSA HEADER	CSA Series Header Version	LO	1
(0029,xx20)	SIEMENS CSA HEADER	CSA Series Header Info	OB	1
(0029,xx08)	SIEMENS MEDCOM HEADER	MedCom Header Type	CS	1
(0029,xx09)	SIEMENS MEDCOM HEADER	MedCom Header Version	LO	1
(0029,xx10)	SIEMENS MEDCOM HEADER	MedCom Header Info	OB	1
(0029,xx20)	SIEMENS MEDCOM HEADER	MedCom History Information	OB	1
(0029,xx31)	SIEMENS MEDCOM HEADER	PMTF Information 1	LO	1
(0029,xx32)	SIEMENS MEDCOM HEADER	PMTF Information 2	UL	1
(0029,xx33)	SIEMENS MEDCOM HEADER	PMTF Information 3	UL	1
(0029,xx34)	SIEMENS MEDCOM HEADER	PMTF Information 4	CS	1
(0029,xx35)	SIEMENS MEDCOM HEADER	PMTF Information 5	UL	1
(0029,xx40)	SIEMENS MEDCOM HEADER	Application Header Sequence	SQ	1

Tag	Private Owner Code	Name	VR	VM
(0029,xx41)	SIEMENS MEDCOM HEADER	Application Header Type	CS	1
(0029,xx42)	SIEMENS MEDCOM HEADER	Application Header ID	LO	1
(0029,xx43)	SIEMENS MEDCOM HEADER	Application Header Version	LO	1
(0029,xx44)	SIEMENS MEDCOM HEADER	Application Header Info	OB	1
(0029,xx50)	SIEMENS MEDCOM HEADER	Workflow Control Flags	LO	8
(0029,xx51)	SIEMENS MEDCOM HEADER	Arch. Management Flag Keep Online	CS	1
(0029,xx52)	SIEMENS MEDCOM HEADER	Arch. Mgmnt Flag Do Not Archive	CS	1
(0029,xx53)	SIEMENS MEDCOM HEADER	Image Location Status	CS	1
(0029,xx54)	SIEMENS MEDCOM HEADER	Estimated Retrieve Time	DS	1
(0029,xx55)	SIEMENS MEDCOM HEADER	Data Size of Retrieved Images	DS	1
(0029,xx08)	SIEMENS MEDCOM OOG	MedCom OOG Type	CS	1
(0029,xx09)	SIEMENS MEDCOM OOG	MedCom OOG Version	LO	1
(0029,xx10)	SIEMENS MEDCOM OOG	MedCom OOG Info	OB	1
(7FE1,xx10)	SIEMENS CSA NON-IMAGE	CSA Data	OB	1

Note: Please be informed that some of the Private Owner Codes contain double-spaces in the name definitions. The following term (only double-spaces marked) are defined:
SIEMENS SMS-AX<spc><spc>VIEW 1.0
SIEMENS SMS-AX<spc><spc>QUANT 1.0

(All spaces not specially marked, are single spaces.)

8.3 Coded Terminology and Templates

8.3.1 Context Groups

8.3.1.1 Orthopedic Report Context Groups

CID Cx01 Scoliosis Types

Table 67 - CID Cx01
Scoliosis Types
Type: Extensible

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
99SMS_OR	ORx50007-0	Unknown
99SMS_OR	ORx50007-1	Structural
99SMS_OR	ORx50007-2	Functional

CID Cx02 Orthopedic Measurement Types

Table 68 - CID Cx02
Orthopedic Measurement Types
Type: Extensible

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
99SMS_OR	ORx50100	Vertical Alignment
99SMS_OR	ORx50200	Cobb Angle
99SMS_OR	ORx50200-1	Cobb Angle Measurement
99SMS_OR	ORx50300	Kyphosis Angle
99SMS_OR	ORx50300-1	Kyphosis Angle Measurement
99SMS_OR	ORx50400	Height Difference
99SMS_OR	ORx50500	Angle
99SMS_OR	ORx50500-1	Angle Measurement
99SMS_OR	ORx50600	Distance
99SMS_OR	ORx50700	Area Measurement

CID Cx03 Vertebra Descriptors

Table 69 - CID Cx03
Vertebra Descriptors
Type: Extensible

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
99SMS_OR	ORx50005-0	Unknown
99SMS_OR	ORx50005-1	C1
99SMS_OR	ORx50005-2	C2
99SMS_OR	ORx50005-3	C3
99SMS_OR	ORx50005-4	C4
99SMS_OR	ORx50005-5	C5
99SMS_OR	ORx50005-6	C6
99SMS_OR	ORx50005-7	C7

99SMS_OR	ORx50005-8	T1
99SMS_OR	ORx50005-9	T2
99SMS_OR	ORx50005-10	T3
99SMS_OR	ORx50005-11	T4
99SMS_OR	ORx50005-12	T5
99SMS_OR	ORx50005-13	T6
99SMS_OR	ORx50005-14	T7
99SMS_OR	ORx50005-15	T8
99SMS_OR	ORx50005-16	T9
99SMS_OR	ORx50005-17	T10
99SMS_OR	ORx50005-18	T11
99SMS_OR	ORx50005-19	T12
99SMS_OR	ORx50005-20	L1
99SMS_OR	ORx50005-21	L2
99SMS_OR	ORx50005-22	L3
99SMS_OR	ORx50005-23	L4
99SMS_OR	ORx50005-24	L5

CID Cx04 Scoliosis Location

Table 70 - CID Cx04
Scoliosis Location
Type: Extensible

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
99SMS_OR	ORx50008-0	Unknown
99SMS_OR	ORx50008-1	Cervical
99SMS_OR	ORx50008-2	Thoracic
99SMS_OR	ORx50008-3	Lumbar

CID Cx05 Scoliosis Direction

Table 71 - CID Cx05
Scoliosis Direction
Type: Extensible

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
99SMS_OR	ORx50009-0	Unknown
99SMS_OR	ORx50009-1	Right Convex
99SMS_OR	ORx50009-2	Left Convex

8.3.2 Template Specifications

8.3.2.1 Orthopedic Report Template

The Orthopedic Report Templates are deployed according to the following structure:

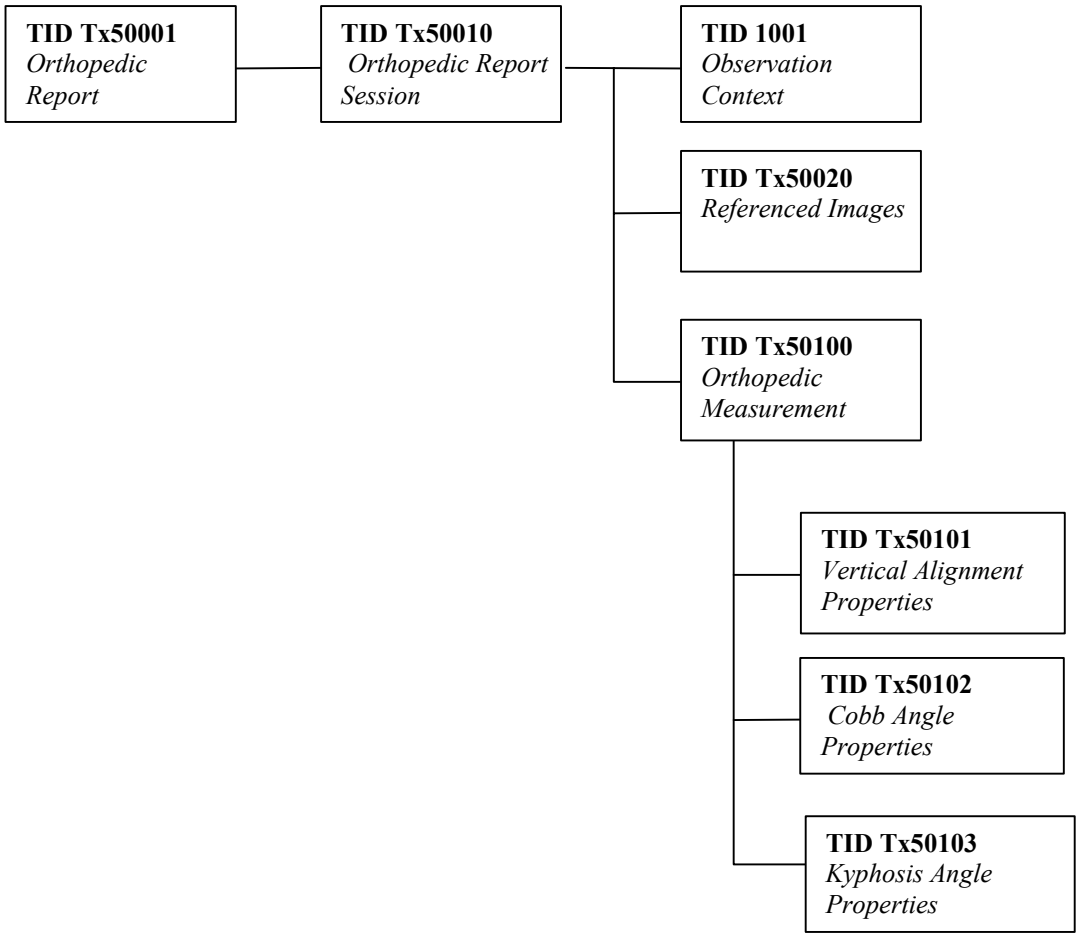


Table 72 - (Private) Orthopedic Report Template

TID Tx50001 Orthopedic Report

This template defines a container (the root) with subsidiary content items, each of which represents a single orthopedic Reporting Session.

Table 73 - TID Tx50001
Orthopedic Report
Type: Extensible

	NL	Rel with Parent	VT	Concept Name	VM	Req-Type	Condition	Value Set Constraint
1			CONTAINER	EV (ORx50001, 99SMS_COMP, ”Orthopedic Report”)	1	M		Root node
2	>	CONTAINS	INCLUDE	DTID (Tx50010) Orthopedic Report Session	1-n	M		

TID Tx50010 Orthopedic Report Session

This general template provides detailed information on an Orthopedic Measurement Session. This includes the Observation Context (Observer as well as Subject and Procedure Context).

Table 74 - TID Tx50010
Orthopedic Report Session
Type: Extensible

	NL	Rel with Parent	VT	Concept Name	VM	Req-Type	Condition	Value Set Constraint
1			CONTAINER	EV (ORx50002, 99SMS_COMP, ”Orthopedic Report Session”)	1	M		
2	>	CONTAINS	INCLUDE	DTID(1001) Observation Context	1	M		
3	>	CONTAINS	INCLUDE	DTID (Tx50020) Referenced Images	1	M		
4	>	CONTAINS	INCLUDE	DTID (Tx50100) Orthopedic Measurements	1	U		$Measurement = DCID (Cx02)
5	>	CONTAINS	TEXT	EV (121106, DCM, “Comment”)	1-n	U		

Content Item Descriptions

1	Observation Date Time (0040,A032) of container needs to be flagged with the time of the session performed
3	Only reference to images used in this session.
5	Comment summary for the report session “as a whole” shall be provided in this content item

Observation Context usage

The following templates are extracted from DICOM Part 16 in order to document Content Item Descriptions as those apply for the usage of Observation Context in Orthopedic Reports,

Table 75 - TID 1002
OBSERVER CONTEXT
Type: Non-Extensible

	NL	Rel with Parent	VT	Concept Name	VM	Req-Type	Condition	Value Set Constraint
1		HAS OBS CONTEXT	CODE	EV (121005,DCM, “Observer Type”)	1	MC	IF Observer Type is device	DCID (270) Observer Type Defaults to (121006,DCM, “Person”)
.	.	…	…	…	.	.	…	…

Content Item Descriptions

1	Observer Type used in Orthopedic Report is “Person”

Table 76 - TID 1003
PERSON OBSERVER IDENTIFYING ATTRIBUTES
Type: Extensible

	NL	Rel with Parent	VT	Concept Name	VM	Req-Type	Condition	Value Set Constraint
1			PNAME	EV (121008,DCM, “Person Observer Name”)	1	M		
.	.	…	…	…	.	.	…	…

Content Item Descriptions

1	will be filled with the observer name selected at the creation of the report

Table 77 - TID 1005
PROCEDURE CONTEXT
Type: Non-Extensible

	NL	Rel with Parent	VT	Concept Name	VM	Req-Type	Condition	Value Set Constraint
1			UIDREF	EV (121018,DCM, “Procedure Study Instance UID”)	1	U		Defaults to Study Instance UID (0020,000D) of General Study Module
.	.	…	…	…	.	.	…	…
5			TEXT	EV(121022,DCM, ”Procedure Accession Number”)	1	U		Defaults to (0008,0050)
.	.	…	…	…	.	.	…	…

Content Item Descriptions

1	will be filled with the Study Instance UID from the first composed image referenced by the report
5	will be filled from the study containing the images referenced by the report session

Table 78 - TID 1006
SUBJECT CONTEXT
Type: Non-Extensible

	NL	Rel with Parent	VT	Concept Name	VM	Req-Type	Condition	Value Set Constraint
1			CODE	EV (121024, DCM, "Subject Class”)	1	M	IF subject is not the Patient	DCID (271) Observation Subject Class Defaults to (121025, DCM, "Patient”)
.	.	…	…	…	.	.	…	…

Content Item Descriptions

1	Subject Class used in Orthopedic Report is “Person”

Table 79 - TID 1007
SUBJECT CONTEXT, PATIENT
Type: Extensible

	NL	Rel with Parent	VT	Concept Name	VM	Req-Type	Condition	Value Set Constraint
.	.	…	…	…	.	.	…	…
2			PNAME	EV (121029,DCM, "Subject Name”)	1	MC	Required if not inherited	

	NL	Rel with Parent	VT	Concept Name	VM	Req-Type	Condition	Value Set Constraint
3			CODE	EV (121030,DCM, “Subject ID”)	1	MC	Required if not inherited	
4			DATE	EV (121031,DCM, "Subject Birth Date”)	1	U		
5			CODE	EV (121032,DCM, "Subject Sex”)	1	U		DCID (7455) Sex
6			NUM	EV (121033,DCM, "Subject Age”)				Units DCID (7456) Units of Measure for Age
.	.	…	…	…	.	.	…	…

Content Item Descriptions

2	will be filled with Patient’s Name of the patient being reported on
3	will be filled with Patient ID of the patient being reported on
4	will be filled with Patient Birth Date of the patient being reported on
5	will be filled with Patient’s Sex of the patient being reported on
6	will be filled with Patient’s Age of the patient being reported on

TID Tx50020 Referenced Images

This general template provides reference to image instances related to an Orthopedic Measurement Session.

Table 80 - TID Tx50020
Referenced Images
Type: Extensible

	NL	Rel with Parent	VT	Concept Name	VM	Req-Type	Condition	Value Set Constraint
1			CONTAINER	EV (ORx50003, 99SMS_COMP, ”Referenced Images”)	1	M		
2	>	CONTAINS	IMAGE	EV(121112, DCM, “Source of Measurement”)	1-n	M		
3	>>	HAS CONCEPT MOD	TEXT	EV(ORx50003-1, 99SMS_COMP, ”Image Number”)	1	U		

Content Item Descriptions

2	One content item for each image referenced
3	Image Number as set in referenced instance

TID Tx50100 Orthopedic Measurements

This general template provides information on the measurement results derived during the performance of an Orthopedic Report Session.

TID Tx50100 Parameters

$Measurement	Coded Term of Orthopedic Measurement type

Table 81 - TID Tx50100
Orthopedic Measurements
Type: Extensible

	NL	Rel with Parent	VT	Concept Name	VM	Req-Type	Condition	Value Set Constraint
1			CONTAINER	EV(121070, DCM, “Findings”)	1	M		
2	>	CONTAINS	CONTAINER	EV(ORx50006, 99SMS_COMP, “Scoliosis”)	1	MC	IFF Row 6 value = (ORx50200, 99SMS_COMP, “Cobb Angle”)	
3	>>	CONTAINS	CODE	EV(ORx50007, 99SMS_COMP, “Scoliosis Type”)	1	M		DCID (Cx01) Scoliosis Types
4	>>>	HAS PROPERTIES	TEXT	EV(121106, DCM, “Comment”)	1	U		
5	>	CONTAINS	CONTAINER	EV(121424, DCM, “Table of Values”)	1-n	M		
6	>>	HAS CONCEPT MOD	CODE	EV(ORx50004, 99SMS_COMP, "Orthopedic Measurement")	1	U		$Measurement
7	>>		INCLUDE	DTID Tx50101 Vertical Alignment Properties	1-n	MC	IFF Row 6 value = (ORx50100, 99SMS_COMP, “Vertical Alignment”	
8	>>		INCLUDE	DTID Tx50102 Cobb Angle Properties	1-n	MC	IFF Row 6 value = (ORx50200, 99SMS_COMP, “Cobb Angle”	
9	>>		INCLUDE	DTID Tx50103 Kyphosis Angle Properties	1-n	MC	IFF Row 6 value = (ORx50300, 99SMS_COMP, “Kyphosis Angle”)	
10	>>	CONTAINS	NUM	$Orthopedic Measurement (CID Cx02)	1-n	MC	XOR Row 6,7,8	
11	>>>	R-INFERRED FROM	IMAGE		1	M		
12	>>>	HAS PROPERTIES	TEXT	EV (ORx50004-1, 99SMS_COMP, “Orthopedic Measurement Label”)	1	M		
13	>>>	HAS PROPERTIES	TEXT	EV (121106, DCM, “Comment”)	1	U		
14	>>	CONTAINS	TEXT	EV (121106, DCM, “Comment”)	1	U		

Content Item Descriptions

5 - 9	includes one container for each type of measurement in the report (i.e. Vertical Alignments, Cobb Angles, Kyphosis Angles, Other Measurements)
10	Value of non-Scoliosis type measurement (e.g. distance measurement in mm or area measurement in cm^2)
11	Reference to image used to measure numeric value specified in Row 10.
12	Label that uniquely identifies the measurement within the image containing it (e.g. HD 1 for a height difference).
13	Free text comment related to this measurement.
14	Free text comment relating to this entire Orthopedic Measurement report

TID Tx50101 Vertical Alignment Properties

This general template provides detailed information on Vertical Alignment Properties derived during an Orthopedic Measurement Session.

Table 82 - TID Tx50101
Vertical Alignment Properties
Type: Extensible

	NL	Rel with Parent	VT	Concept Name	VM	Req-Type	Condition	Value Set Constraint
1		CONTAINS	NUM	EV (ORx50100, 99SMS_COMP, ”Vertical Alignment”)	1	M		UNITS = EV (cm, UCUM “centimeter”)
2	>	R-INFERRED FROM	IMAGE		1	M		
3	>	HAS PROPERTIES	TEXT	EV (ORx50004-1, 99SMS_COMP, ”Orthopedic Measurement Label”)	1	M		
4	>	HAS PROPERTIES	CODE	EV (ORx50005, 99SMS_COMP, ”Vertebra”)	1	U		DCID (Cx03) Vertebra Descriptors
5	>	HAS PROPERTIES	TEXT	EV (121106, DCM, “Comment”)	1	U		

Content Item Descriptions

2	Reference to the image this measurements is derived from.
3	Unique identifier for this measurement. “VA 1” to “VA n”.
4	Vertebra descriptor indicating the vertebra associated with this vertical alignment.
5	A free-text comment about this vertical alignment measurement.

TID Tx50102 Cobb Angle Properties

This general template provides detailed information on Cobb Angle Properties derived during an Orthopedic Measurement Session.

Table 83 - TID Tx50102
Cobb Angle Properties
Type: Extensible

	NL	Rel with Parent	VT	Concept Name	VM	Req-Type	Condition	Value Set Constraint
1		CONTAINS	NUM	EV (ORx50200, 99SMS_COMP, ”Cobb Angle”)	1	M		UNITS = EV (deg, UCUM “degrees”)
2	>	R-INFERRED FROM	IMAGE		1	M		
3	>	HAS PROPERTIES	TEXT	EV (ORx50004-1, 99SMS_COMP, ”Orthopedic Measurement Label”)	1	M		
4	>	HAS PROPERTIES	CODE	EV (ORx50005, 99SMS_COMP, ”Vertebra”)	1	U		DCID (Cx03) Vertebra Descriptors
5	>	HAS PROPERTIES	CODE	EV (ORx50009, 99SMS_COMP, ”Scoliosis Direction”)	1	U		DCID (Cx05) Scoliosis Direction
6	>	HAS PROPERTIES	TEXT	EV (121106, DCM, “Comment”)	1	U		

Content Item Descriptions

2	Reference to the image this measurements is derived from.
3	Unique identifier for this measurement. “CB 1,2”, “CB 2,3” to “CB n-1,n”.
4	Vertebra descriptor indicating the vertebra associated with this Cobb angle.
5	Indicator of the direction of this scoliosis.
6	A free-text comment about this Cobb angle measurement.

TID Tx50103 Kyphosis Angle Properties

This general template provides detailed information on Kyphosis Angle Properties derived during an Orthopedic Measurement Session.

Table 84 - TID Tx50103
Kyphosis Angle Properties
Type: Extensible

	NL	Rel with Parent	VT	Concept Name	VM	Req-Type	Condition	Value Set Constraint
1		CONTAINS	NUM	EV (ORx50300, 99SMS_COMP, ”Kyphosis Angle”)	1	M		UNITS = EV (deg, UCUM “degrees”)
2	>	R-INFERRED FROM	IMAGE		1	M		
3	>	HAS PROPERTIES	TEXT	EV (ORx50004-1, 99SMS_COMP, ”Orthopedic Measurement Label”)	1	M		
4	>	HAS PROPERTIES	CODE	EV (ORx50005, 99SMS_COMP, ”Vertebra”)	1	U		DCID (Cx03) Vertebra Descriptors
5	>	HAS PROPERTIES	TEXT	EV (121106, DCM, “Comment”)	1	U		

Content Item Descriptions

2	Reference to the image this measurements is derived from.
3	Unique identifier for this measurement. “Ky 1” to “Ky n”.
4	Vertebra descriptor indicating the vertebra associated with this Kyphosis angle.
6	A free-text comment about this Kyphosis angle measurement.

8.3.3 Private Code Definitions

Please refer to the Template Specification and Context Groups sections for details on private codes introduced by syngo X-Workplace applications.

8.4 Grayscale Image Consistency

The high resolution TFT display monitor option of syngo X-Workplace comes with a DICOM Grayscale Standard Display Function (GSDF) compliant factory pre-setting. A typical working environment setup is assumed for ambient light.

8.5 Standard Extended/Specialized/Private SOP Classes

8.5.1 Standard Extended XA

The XA SOP Instances created by syngo X-Workplace are standard-extended by adding the following private module attributes.

Table 85 - Private Modules for Standard Extended XA

IE	Module	Reference	Usage	Note
Image	Angio Viewing	8.5.1.1	U	If Store Monitor Image from Angio Viewer
	Angio Quantification	8.5.1.2	U	if image is a Quant Report

8.5.1.1 Angio Viewing Module

Table 86 - (Private) Angio Viewing Module Attributes

Attribute Name	Tag	Owner	Type	Notes
Review Mode	(0019,xx00)	SIEMENS SMS-AX VIEW 1.0	3	Special Modes for Angio Review. Defined Terms are 1 = REV_MAXFILL, 2 = REV_LOOP, 3 = REV_SCROLL, 4 = REV_STEREO_LOOP
Anatomical Background Percent	(0019,xx01)	SIEMENS SMS-AX VIEW 1.0	3	Percentage of Mix between Subtracted Image Result and Native Mask. Range is from 0 to 100.
Number of Phases	(0019,xx02)	SIEMENS SMS-AX VIEW 1.0	3	1-4 (1 or # of "Variable Frame Rate" acq phases)
Apply Anatomical Background	(0019,xx03)	SIEMENS SMS-AX VIEW 1.0	3	boolean
Pixel Shift Array	(0019,xx04)	SIEMENS SMS-AX VIEW 1.0	3	4 * Number of Frames (0028,0008)
Brightness	(0019,xx05)	SIEMENS SMS-AX VIEW 1.0	3	SUB windowing
Contrast	(0019,xx06)	SIEMENS SMS-AX VIEW 1.0	3	SUB windowing
Enabled Shutter	(0019,xx07)	SIEMENS SMS-AX VIEW 1.0	3	Visualize shutter
Native Edge Enhancement Percent Gain	(0019,xx08)	SIEMENS SMS-AX VIEW 1.0	3	Percent gain for native display of images.
Native Edge Enhancement LUT Index	(0019,xx09)	SIEMENS SMS-AX VIEW 1.0	3	
Native Edge Enhancement Kernel Size	(0019,xx0A)	SIEMENS SMS-AX VIEW 1.0	3	
Subtracted Edge Enhancement Percent Gain	(0019,xx0B)	SIEMENS SMS-AX VIEW 1.0	3	Percent gain for subtracted display of images.
Subtracted Edge Enhancement LUT Index	(0019,xx0C)	SIEMENS SMS-AX VIEW 1.0	3	
Subtracted Edge Enhancement Kernel Size	(0019,xx0D)	SIEMENS SMS-AX VIEW 1.0	3	
Fade Percent	(0019,xx0E)	SIEMENS SMS-AX VIEW 1.0	3	
Flipped before Laterality Applied	(0019,xx0F)	SIEMENS SMS-AX VIEW 1.0	3	
Apply Fade	(0019,xx10)	SIEMENS SMS-AX VIEW 1.0	3	
RefImages Taken	(0019,xx11)	SIEMENS SMS-AX VIEW 1.0	3	
Zoom	(0019,xx12)	SIEMENS SMS-AX	3	

Attribute Name	Tag	Owner	Type	Notes
		VIEW 1.0		
Pan X	(0019,xx13)	SIEMENS SMS-AX VIEW 1.0	3	
Pan Y	(0019,xx14)	SIEMENS SMS-AX VIEW 1.0	3	
Native Edge Enhancement Adverse Percent Gain	(0019,xx15)	SIEMENS SMS-AX VIEW 1.0	3	
Subtracted Edge Enhancement Adverse Percent Gain	(0019,xx16)	SIEMENS SMS-AX VIEW 1.0	3	

8.5.1.2 Angio Quantification Module

The table in this section contains private IOD Elements that describe additional Attributes for advanced Angio Quantification and Calibration Results features.

Table 87 - (Private) Angio Quantification Module Attributes

Attribute Name	Tag	Owner	Type	Notes
Horizontal Calibration Pixel Size	(0023,xx00)	SIEMENS SMS-AX QUANT 1.0	3	(in mm)
Vertical Calibration Pixel Size	(0023,xx01)	SIEMENS SMS-AX QUANT 1.0	3	(in mm)
Calibration Object	(0023,xx02)	SIEMENS SMS-AX QUANT 1.0	3	
Calibration Object Size	(0023,xx03)	SIEMENS SMS-AX QUANT 1.0	3	
Calibration Method	(0023,xx04)	SIEMENS SMS-AX QUANT 1.0	3	
Filename	(0023,xx05)	SIEMENS SMS-AX QUANT 1.0	3	
Frame Number	(0023,xx06)	SIEMENS SMS-AX QUANT 1.0	3	
Calibration Factor Multiplicity	(0023,xx07)	SIEMENS SMS-AX QUANT 1.0	3	Multiplicity Horizontal followed by Multiplicity for Vertical

8.5.2 Standard Extended for Other Created SOP Class

Any SOP Instances created by syngo X-Workplace can be standard-extended by adding the following *syngo* private module attributes.

Table 88 - Private Modules for Other Created SOP Class

IE	Module	Reference	Usage	Note
Image	CSA Image Header	8.5.2.1	U	private GG information
	CSA Series Header	8.5.2.2	U	
	MEDCOM Header	8.5.2.3	U	private *syngo* information
	MEDCOM OOG	8.5.2.4	U	if object graphics is attached to image

8.5.2.1 CSA Image Header

The table in this section contains private IOD Attributes that describe the CSA Image Header:

Table 89 - CSA Image Header Attributes

Attribute Name	Tag	Owner	Type	Notes
CSA Image Header Type	(0029,xx08)	SIEMENS CSA HEADER	1	CSA Image Header identification characteristics. Defined Terms: NUM 4 = NUMARIS/4 SOM 5 = SOMARIS/5
CSA Image Header Version	(0029,xx09)	SIEMENS CSA HEADER	3	Version of CSA Image Header Info (0029,xx10) format.
CSA Image Header Info	(0029,xx10)	SIEMENS CSA HEADER	3	Manufacturer model dependent information.

8.5.2.2 CSA Series Header

The table in this section contains private IOD Attributes that describe the CSA Series Header:

Table 90 - CSA Series Header Attributes

Attribute Name	Tag	Owner	Type	Notes
CSA Series Header Type	(0029,xx18)	SIEMENS CSA HEADER	1	CSA Series Header identification characteristics. Defined Terms: NUM 4 = NUMARIS/4
CSA Series Header Version	(0029,xx19)	SIEMENS CSA HEADER	3	Version of CSA Series Header Info (0029,xx20) format.
CSA Series Header Info	(0029,xx20)	SIEMENS CSA HEADER	3	Manufacturer model dependent information.

8.5.2.3 MEDCOM Header

The table in this section contains private IOD Attributes that describe the MEDCOM Header:

Table 91 - MEDCOM Header Attributes

Attribute Name	Tag	Owner	Type	Notes
MedCom Header Type	(0029,xx08)	SIEMENS MEDCOM HEADER	1C	MedCom Header identification characteristics. Defined Terms: MEDCOM 1 (Required if MedCom Header Info (0029,xx10) present.)
MedCom Header Version	(0029,xx09)	SIEMENS MEDCOM HEADER	2C	Version of MedCom Header Info (0029,xx10) format. (Required if MEDCOM Header Info (0029,xx10) present.)
MedCom Header Info	(0029,xx10)	SIEMENS MEDCOM HEADER	3	Manufacturer model dependent information. The value of the attribute MedCom Header Info (0029,xx10) can be build up in each user defined format.
MedCom History Information	(0029,xx20)	SIEMENS MEDCOM HEADER	3	MedCom defined Patient Registration history information. See A.1.3.1.
PMTF Information 1	(0029,xx31)	SIEMENS MEDCOM HEADER	3	Transformation Information
PMTF Information 2	(0029,xx32)	SIEMENS MEDCOM HEADER	3	Transformation Information
PMTF Information 3	(0029,xx33)	SIEMENS MEDCOM HEADER	3	Transformation Information
PMTF Information 4	(0029,xx34)	SIEMENS MEDCOM HEADER	3	Transformation Information
PMTF Information 5	(0029,xx35)	SIEMENS MEDCOM HEADER	3	Transformation Information

Attribute Name	Tag	Owner	Type	Notes
Application Header Sequence	(0029,xx40)	SIEMENS MEDCOM HEADER	3	Sequence of Application Header items. Zero or more items are possible.
>Application Header Type	(0029,xx41)	SIEMENS MEDCOM HEADER	1C	Application Header identification characteristics. Required, if Sequence is sent.
>Application Header ID	(0029,xx42)	SIEMENS MEDCOM HEADER	3	Identification of an application header
>Application Header Version	(0029,xx43)	SIEMENS MEDCOM HEADER	3	Version of CSA Series Header Info (0029,xx44) format.
>Application Header Info	(0029,xx44)	SIEMENS MEDCOM HEADER	3	Application dependent information.
Workflow Control Flags	(0029,xx50)	SIEMENS MEDCOM HEADER	3	Eight free definable flags.
Archive Management Flag Keep Online	(0029,xx51)	SIEMENS MEDCOM HEADER	3	Flag to control remote archive management system to keep the image always online (also when already archived). Enumerated Values: 00 = remote control not required 01 = keep image online
Archive Management Flag Do Not Archive	(0029,xx52)	SIEMENS MEDCOM HEADER	3	Flag to control remote archive management system not to archive the related image. Enumerated Values: 00 = remote control not required 01 = don't archive image
Image Location Status	(0029,xx53)	SIEMENS MEDCOM HEADER	3	Image location status to control retrieving. Defined Terms: ONLINE = retrieving has to be done as usual, NEARLINE = move request to SCP and delay according to value of Estimated Retrieve Time (0029,xx54), OFFLINE = invoking a retrieve operation initiates an operator request, INVALID = invoking a retrieve operation would always result in an error.
Estimated Retrieve Time	(0029,xx54)	SIEMENS MEDCOM HEADER	3	Estimated retrieve time in seconds. A value less then zero (< 0) indicates location is OFFLINE or INVALID.
Data Size of Retrieved Images	(0029,xx55)	SIEMENS MEDCOM HEADER	3	Data size of images in MByte.

8.5.2.3.1 MEDCOM History Information

The value of the attribute MEDCOM History Information (0029,xx20) is defined in the following way:

Table 92 - MEDCOM History Information Attributes

Part	Name	Type	Bytes	Notes
header	Identifier	string	32	Always "CSA HISTORY"
	Version	string	32	e.g. "V1.10"
>n Items	Class Name	string	64	
	Modification String	string	1024	

8.5.2.4 MEDCOM OOG

This module is used whenever object graphics is drawn on the image and need to be stored as graphic object properties. Given the condition that the module contents was not removed by other modalities, the graphic objects remain "re-animatable" if such an image was transferred and is then retrieved back

Table 93 - MEDCOM OOG Attributes

Attribute Name	Tag	Owner	Type	Notes
CSA Series Header Type	(0029,xx08)	SIEMENS MEDCOM OOG	1	MEDCOM Object Oriented Graphics (OOG) identification characteristics. Defined Terms: MEDCOM OOG 1 MEDCOM OOG 2
CSA Series Header Version	(0029,xx09)	SIEMENS MEDCOM OOG	3	Version of MEDCOM OOG Info (0029,xx10) format.
CSA Series Header Info	(0029,xx10)	SIEMENS MEDCOM OOG	3	MEDCOM Object Oriented Graphics (OOG) data.

The graphics objects are also fully encoded in the Image Overlay Plane for compatibility with other products, which do not support the MedCom OOG module. Any system not supporting the MedCom OOG module shall remove the OOG module and its contents when modifying the image overlay plane content.

8.5.3 SIEMENS Private Non-Image IOD

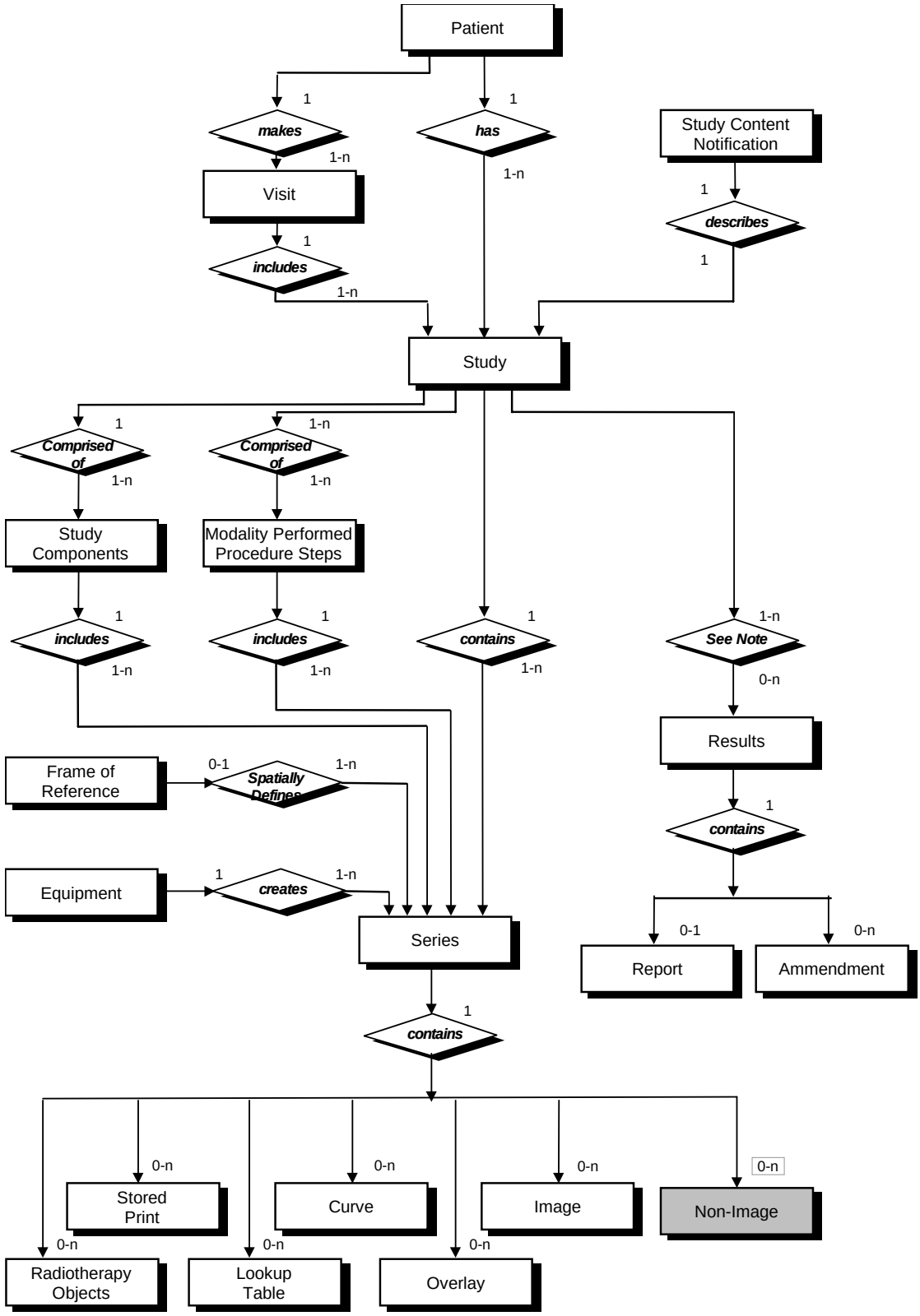
For encoding binary data-streams not representing image data, Siemens has created a private "Non-Image IOD" according to the rules governed by the DICOM Standard. The following section will roll-out the definition of this Private IOD. It can be communicated with Network Storage Service and Offline Media Storage Services.

The Siemens "Non-Image IOD" is identified by a private Non-Image Storage SOP Class UID of

"1.3.12.2.1107.5.9.1"

8.5.3.1 Siemens Non-Image IOD - E-R Model

The E-R model depicts those components of the DICOM Information Model which directly refer to the Siemens Non-Image IOD. The Frame of Reference IE, Overlay IE, Modality Lookup-Table IE, VOI Lookup-Table IE and Curve IE are not components of the Siemens Non-Image IOD.


Patient
1
makes
1-n
Visit
1
includes
1-n
1
has
1-n
Study Content Notification
1
describes
1
Study
1
Comprised of
1-n
Study Components
1-n
Comprised of
1-n
Modality Performed Procedure Steps
1
contains
1-n
1-n
See Note
0-n
Results
1
contains
0-1
Report
0-n
Ammendment
1
includes
1-n
1
includes
1-n
Frame of Reference
0-1
Spatially Defines
1-n
Equipment
1
creates
1-n
Series
1
contains
0-n
Stored Print
0-n
Radiotherapy Objects
0-n
Curve
0-n
Lookup Table
0-n
Image
0-n
Overlay
0-n
Non-Image

8.5.3.2 Siemens Non-Image IOD - Module Table

Table 94 - Siemens Non-Image IOD Module Table

IE	Module	Reference	Usage
Patient	Patient	[1] PS3.3 C.7.1.1	M
Study	General Study	[1] PS3.3 C.7.2.1	M
	Patient Study	[1] PS3.3 C.7.2.2	U
Series	General Series	[1] PS3.3 C.7.3.1	M
Equipment	General Equipment	[1] PS3.3 C.7.5.1	U
CSA	CSA Image Header	8.5.2.1	U
	CSA Series Header	8.5.2.2	U
	MEDCOM Header	8.5.2.3	U
	CSA Non-Image	8.5.3.3.1	M
	SOP Common	[1] PS3.3 C.12.1	M

8.5.3.3 Siemens Non-Image IOD - Modules

8.5.3.3.1 CSA Non-Image Module

The table in this section contains private IOD Attributes that describe CSA Non-Images.

Table 95 - CSA Non-Image Module Attributes

Attribute Name	Tag	Owner	Type	Notes
Image Type	(0008,0008)	-	3	Image identification characteristics.
Acquisition Date	(0008,0022)	-	3	The date the acquisition of data that resulted in this data set started.
Acquisition Time	(0008,0023)	-	3	The time the acquisition of data that resulted in this data set started.
Conversion Type	(0008,0064)	-	3	Describes the kind of image conversion. Defined Terms: DV = Digitized Video, DI = Digital Interface, DF = Digitized Film, WSD = Workstation.
Referenced Image Sequence	(0008,1140)	-	3	A sequence which provides reference to a set of Image SOP Class/Instance identifying other images significantly related to this data set. Encoded as sequence of items: (0008,1150) and (0008,1155).
Derivation Description	(0008,2111)	-	3	A text description of how this data set was derived.
Source Image Sequence	(0008,2112)	-	3	A Sequence which identifies the set of Image SOP Class/Instance pairs of the Images which were used to derive this data set. Zero or more Items may be included in this Sequence. Encoded as sequence of items: (0008,1150) and (0008,1155).
Patient Position	(0018,5100)	-	3	Patient position descriptor relative to the equipment.
Acquisition Number	(0020,0012)	-	3	A number identifying the single continuous gathering of data over a period of time which resulted in this data set.
Image Number	(0020,0013)	-	3	A number that identifies this data set.
Frame of Reference UID	(0020,0052)	-	3	Uniquely identifies the frame of reference for a Series.
Image Comments	(0020,4000)	-	3	User-defined comments about the image.
Quality Control Image	(0028,0300)	-	3	Indicates whether or not this image is a quality control or phantom image. If this Attribute is absent, then the image may or may not be a quality control or

Attribute Name	Tag	Owner	Type	Notes
				phantom image. Enumerated Values: YES, NO.
Burned in Annotation	(0028,0301)	-	3	Indicates whether or not image contains sufficient burned in annotation to identify the patient and date the image was acquired. If this Attribute is absent, then the image may or may not contain burned in annotation. Enumerated Values: YES, NO.
Lossy Image Compression	(0028,2110)	-	3	Specifies whether an Image has undergone lossy compression. Enumerated Values: 00 = Image has not been subjected to lossy compression, 01 = Image has been subjected to lossy compression.
Lossy Image Compression Ratio	(0028,2112)	-	3	Describes the approximate lossy compression ratio(s) that have been applied to this image. May be multi valued if successive lossy compression steps have been applied.
CSA Data Type	(0029,xx08)	SIEMENS CSA NON-IMAGE	1	CSA Data identification characteristics. Defined Terms: BSR REPORT = Study Report Data RT3D CONFIG = InSpace3D Data RT3D MASK = InSpace3D Mask
CSA Data Version	(0029,xx09)	SIEMENS CSA NON-IMAGE	3	Version of CSA Data Info (0029,xx10) format and CSA Non-Image Data (7FE1,xx10) format.
CSA Data Info	(0029,xx10)	SIEMENS CSA NON-IMAGE	3	Information to describe the CSA Data (7FE1,xx10).
CSA Data	(7FE1,xx10)	SIEMENS CSA NON-IMAGE	2	Binary data as byte stream.

8.6 Private Transfer Syntaxes

No private Transfer Syntaxes are defined for or requested by syngo X-Workplace DICOM application.

8.7 DICOM Print SCU - detailed status displays

The following tables document the behavior of the syngo X-Workplace DICOM Print AE in response to messages received for the Printer SOP class and the Print Job SOP class.

Definition of camera symbols:

- Idle: Camera is installed and ready; idle icon is displayed.
- Interact: The user has to react in near future, but not immediately.
  Example: A camera was low in 8x10 clear sheets: LOW 8x10 CLR was sent by N-EVENT-REPORT.
- Queue Stopped: The user has to react immediately. Either the camera needs immediate interaction or a job has been aborted.
  Example: A camera is out of 8x10 clear sheets, or camera is down, or a film job is aborted

Note: different camera symbols are displayed according to the Printer Status Info.

8.7.1 Common Status Information

Table 96 - Print SCU Common Status Information

Printer Status Info/ Execution Status Info	Description	Message string visible in 'Status Bar'	Other action for UI/ 'camera symbol'
NORMAL	Camera is ready	Camera is ready	<None>/idle
BAD RECEIVE MGZ	There is a problem with the film receive magazine. Films from the printer cannot be transported into the magazine.	Problem with receive magazine.	<None>/interact
BAD SUPPLY MGZ	There is a problem with the film supply magazine. Films from this magazine cannot be transported into the printer.	Problem with supply magazine.	<None>/interact
CALIBRATING	Printer is performing self calibration, it is expected to be available for normal operation shortly.	Self calibration. Please wait.	<None>/idle
CALIBRATION ERR	An error in the printer calibration has been detected, quality of processed films may not be optimal.	Problem in calibration. Film quality may not be optimal.	<None>/interact
CHECK CHEMISTRY	A problem with the processor chemicals has been detected, quality of processed films may not be optimal.	Problem with chemistry. Film quality may not be optimal.	<None>/interact
CHECK SORTER	There is an error in the film sorter	Error in film sorter.	<None>/interact
CHEMICALS EMPTY	There are no processing chemicals in the processor, films will not be printed and processed until the processor is back to normal.	Camera chemistry empty. Please check.	<None>/interact
CHEMICALS LOW	The chemical level in the processor is low, if not corrected, it will probably shut down soon.	Camera chemistry low. Please check.	<None>/interact
COVER OPEN	One or more printer or processor covers, drawers, doors are open.	Camera cover, drawer or door open.	<None>/interact
ELEC CONFIG ERR	Printer configured improperly for this job.	Camera configured improperly for this job. Queue stopped.	**Queue for this camera will be STOPPED/ Queue stopped**
ELEC DOWN	Printer is not operating due to some unspecified electrical hardware problem.	Camera electrical hardware Problem.	<None>/interact
ELEC SW ERROR	Printer not operating for some unspecified software error.	Camera software problem. Queue stopped.	**Queue for this camera will be STOPPED/ Queue stopped**
EMPTY 8x10	The 8x10 inch film supply magazine is empty.	8x10 film supply empty.	<None>/interact
EMPTY 8x10 BLUE	The 8x10 inch blue film supply magazine is empty.	8x10 blue film supply empty.	<None>/interact
EMPTY 8x10 CLR	The 8x10 inch clear film supply magazine is empty.	8x10 clear film supply empty.	<None>/interact
EMPTY 8x10 PAPR	The 8x10 inch paper supply magazine is empty.	8x10 paper supply empty.	<None>/interact
EMPTY 10x12	The 10x12 inch film supply magazine is empty.	10x12 film supply empty.	<None>/interact
EMPTY 10x12 BLUE	The 10x12 inch blue film supply magazine is empty.	10x12 blue film supply empty.	<None>/interact
EMPTY 10x12 CLR	The 10x12 inch clear film supply magazine is empty.	10x12 clear film supply empty.	<None>/interact
EMPTY 10x12 PAPR	The 10x12 inch paper supply magazine is empty.	10x12 paper supply empty.	<None>/interact
EMPTY 10x14	The 10x14 inch film supply magazine is empty.	10x14 film supply empty.	<None>/interact
EMPTY 10x14 BLUE	The 10x14 inch blue film supply magazine is empty.	10x14 blue film supply empty.	<None>/interact
EMPTY 10x14 CLR	The 10x14 inch clear film supply magazine is empty.	10x14 clear film supply empty.	<None>/interact
EMPTY 10x14 PAPR	The 10x14 inch paper supply magazine is empty.	10x14 paper supply empty.	<None>/interact
EMPTY 11x14	The 11x14 inch film supply magazine is empty.	11x14 film supply empty.	<None>/interact
EMPTY 11x14 BLUE	The 11x14 inch blue film supply magazine is empty.	11x14 blue film supply empty.	<None>/interact

Printer Status Info/ Execution Status Info	Description	Message string visible in 'Status Bar'	Other action for UI/ 'camera symbol'
EMPTY 11x14 CLR	The 11x14 inch clear film supply magazine is empty.	11x14 clear film supply empty.	<None>/interact
EMPTY 11x14 PAPR	The 11x14 inch paper supply magazine is empty.	11x14 paper supply empty.	<None>/interact
EMPTY 14x14	The 14x14 inch film supply magazine is empty.	14x14 film supply empty.	<None>/interact
EMPTY 14x14 BLUE	The 14x14 inch blue film supply magazine is empty.	14x14 blue film supply empty.	<None>/interact
EMPTY 14x14 CLR	The 14x14 inch clear film supply magazine is empty.	14x14 clear film supply empty.	<None>/interact
EMPTY 14x14 PAPR	The 14x14 inch paper supply magazine is empty.	14x14 paper supply empty.	<None>/interact
EMPTY 14x17	The 14x17 inch film supply magazine is empty.	14x17 film supply empty.	<None>/interact
EMPTY 14x17 BLUE	The 14x17 inch blue film supply magazine is empty.	14x17 blue film supply empty.	<None>/interact
EMPTY 14x17 CLR	The 14x17 inch clear film supply magazine is empty.	14x17 clear film supply empty.	<None>/interact
EMPTY 14x17 PAPR	The 14x17 inch paper supply magazine is empty.	14x17 paper supply empty.	<None>/interact
EMPTY 24x24	The 24x24 inch film supply magazine is empty.	24x24 film supply empty.	<None>/interact
EMPTY 24x24 BLUE	The 24x24 inch blue film supply magazine is empty.	24x24 blue film supply empty.	<None>/interact
EMPTY 24x24 CLR	The 24x24 inch clear film supply magazine is empty.	24x24 clear film supply empty.	<None>/interact
EMPTY 24x24 PAPR	The 24x24 inch paper supply magazine is empty.	24x24 paper supply empty	<None>/interact
EMPTY 24x30	The 24x30 inch film supply magazine is empty.	24x30 film supply empty.	<None>/interact
EMPTY 24x30 BLUE	The 24x30 inch blue film supply magazine is empty.	24x30 blue film supply empty.	<None>/interact
EMPTY 24x30 CLR	The 24x30 inch clear film supply magazine is empty.	24x30 clear film supply empty.	<None>/interact
EMPTY 24x30 PAPR	The 24x30 inch paper supply magazine is empty.	24x30 paper supply empty.	<None>/interact
EMPTY A4 PAPR	The A4 paper supply magazine is empty.	A4 paper supply empty	<None>/interact
EMPTY A4 TRANS	The A4 transparency supply magazine is empty.	A4 transparency supply empty.	<None>/interact
EXPOSURE FAILURE	The exposure device has failed due to some unspecified reason.	Exposure device has failed.	<None>/interact
FILM JAM	A film transport error has occurred and a film is jammed in the printer or processor.	Film jam.	<None>/interact
FILM TRANSP ERR	There is a malfunction with the film transport, there may or may not be a film jam.	Film transport problem.	<None>/interact
FINISHER EMPTY	The finisher is empty.	Finisher is empty.	<None>/interact
FINISHER ERROR	The finisher is not operating due to some unspecified reason	Finisher problem.	<None>/interact
FINISHER LOW	The finisher is low on supplies.	Finisher low.	<None>/interact
LOW 8x10	The 8x10 inch film supply magazine is low.	8x10 film supply low.	<None>/interact
LOW 8x10 BLUE	The 8x10 inch blue film supply magazine is low.	8x10 blue film supply low.	<None>/interact
LOW 8x10 CLR	The 8x10 inch clear film supply magazine is low.	8x10 clear film supply low.	<None>/interact
LOW 8x10 PAPR	The 8x10 inch paper supply magazine is low.	8x10 paper supply low.	<None>/interact
LOW 10x12	The 10x12 inch film supply magazine is low.	10x12 film supply low.	<None>/interact
LOW 10x12 BLUE	The 10x12 inch blue film supply magazine is low.	10x12 blue film supply low.	<None>/interact
LOW 10x12 CLR	The 10x12 inch clear film supply magazine is low.	10x12 clear film supply low.	<None>/interact
LOW 10x12 PAPR	The 10x12 inch paper supply magazine is low.	10x12 paper supply low.	<None>/interact
LOW 10x14	The 10x14 inch film supply magazine is low.	10x14 film supply low.	<None>/interact

Printer Status Info/ Execution Status Info	Description	Message string visible in 'Status Bar'	Other action for UI/ 'camera symbol'
LOW 10x14 BLUE	The 10x14 inch blue film supply magazine is low.	10x14 blue film supply low.	<None>/interact
LOW 10x14 CLR	The 10x14 inch clear film supply magazine is low.	10x14 clear film supply low.	<None>/interact
LOW 10x14 PAPR	The 10x14 inch paper supply magazine is low.	10x14 paper supply low.	<None>/interact
LOW 11x14	The 11x14 inch film supply magazine is low.	11x14 film supply low.	<None>/interact
LOW 11x14 BLUE	The 11x14 inch blue film supply magazine is low.	11x14 blue film supply low.	<None>/interact
LOW 11x14 CLR	The 11x14 inch clear film supply magazine is low.	11x14 clear film supply low.	<None>/interact
LOW 11x14 PAPR	The 11x14 inch paper supply magazine is low.	11x14 paper supply low.	<None>/interact
LOW 14x14	The 14x14 inch film supply magazine is low.	14x14 film supply low.	<None>/interact
LOW 14x14 BLUE	The 14x14 inch blue film supply magazine is low.	14x14 blue film supply low.	<None>/interact
LOW 14x14 CLR	The 14x14 inch clear film supply magazine is low.	14x14 clear film supply low.	<None>/interact
LOW 14x14 PAPR	The 14x14 inch paper supply magazine is low.	14x14 paper supply low.	<None>/interact
LOW 14x17	The 14x17 inch film supply magazine is low.	14x17 film supply low.	<None>/interact
LOW 14x17 BLUE	The 14x17 inch blue film supply magazine is low.	14x17 blue film supply low.	<None>/interact
LOW 14x17 CLR	The 14x17 inch clear film supply magazine is low.	14x17 clear film supply low.	<None>/interact
LOW 14x17 PAPR	The 14x17 inch paper supply magazine is low.	14x17 paper supply low.	<None>/interact
LOW 24x24	The 24x24 inch film supply magazine is low.	24x24 film supply low.	<None>/interact
LOW 24x24 BLUE	The 24x24 inch blue film supply magazine is low.	24x24 blue film supply low.	<None>/interact
LOW 24x24 CLR	The 24x24 inch clear film supply magazine is low.	24x24 clear film supply low.	<None>/interact
LOW 24x24 PAPR	The 24x24 inch paper supply magazine is low.	24x24 paper supply low.	<None>/interact
LOW 24x30	The 24x30 inch film supply magazine is low.	24x30 film supply low.	<None>/interact
LOW 24x30 BLUE	The 24x30 inch blue film supply magazine is low.	24x30 blue film supply low.	<None>/interact
LOW 24x30 CLR	The 24x30 inch clear film supply magazine is low.	24x30 clear film supply low.	<None>/interact
LOW 24x30 PAPR	The 24x30 inch paper supply magazine is low.	24x30 paper supply low.	<None>/interact
LOW A4 PAPR	The A4 paper supply magazine is low.	A4 paper supply low.	<None>/interact
LOW A4 TRANS	The A4 transparency supply magazine is low..	A4 transparency supply low.	<None>/interact
NO RECEIVE MGZ	The film receive magazine is not available.	Film receiver not available.	<None>/interact
NO RIBBON	The ribbon cartridge needs to be replaced.	Replace ribbon cartridge.	<None>/interact
NO SUPPLY MGZ	The film supply magazine is not available.	Film supply not available.	<None>/interact
CHECK PRINTER	The printer is not ready at this time, operator intervention is required to make the printer available.	Check camera.	<None>/interact
CHECK PROC	The processor is not ready at this time, operator intervention is required to make the printer available.	Check processor.	<None>/interact
PRINTER DOWN	The printer is not operating due to some unspecified reason.	Camera down.	<None>/interact
PRINTER INIT	The printer is not ready at this time, it is expected to become available without intervention. For example, it may be in a normal warm-up state.	Camera initializing.	<None>/Idle
PRINTER OFFLINE	The printer has been disabled by an operator or service person.	Camera off-line.	<None>/interact
PROC DOWN	The processor is not operating due to	Processor down.	<None>/interact

Printer Status Info/ Execution Status Info	Description	Message string visible in 'Status Bar'	Other action for UI/ 'camera symbol'
	some unspecified reason.		
PROC INIT	The processor is not ready at this time, it is expected to become available without intervention. For example, it may be in a normal warm-up state.	Processor initializing.	<None>/Idle
PROC OVERFLOW FL	Processor chemicals are approaching the overflow full mark.	Processor chemicals near overflow.	<None>/interact
PROC OVERFLOW HI	Processor chemicals have reached the overflow full mark.	Processor chemicals overflow.	<None>/interact
QUEUED	Print job in Queue	--	<None>/Idle
RECEIVER FULL	The film receive magazine is full.	Receiver full.	<None>/interact
REQ MED NOT INST	The requested film, paper, or other media supply magazine is installed in the printer, but may be available with operator intervention.	Install media supply.	<None>/interact
REQ MED NOT AVAI	The requested film, paper, or other media requested is not available on this printer.	Media supply not available on this camera. Queue stopped. Change camera.	**Queue for this camera will be STOPPED/ Queue stopped**
RIBBON ERROR	There is an unspecified problem with the print ribbon.	Error with print ribbon.	<None>/interact
SUPPLY EMPTY	The printer is out of film.	Camera out of film.	<None>/interact
SUPPLY LOW	The film supply is low.	Film supply low.	<None>/interact
UNKNOWN	There is an unspecified problem.	Unspecified problem with camera.	<None>/interact

8.7.2 Additional Status Information - AGFA printers

Table 97 - Print SCU Additional AGFA Printer Status Evaluation

Printer Status Info/ Execution Status Info	Description	Message string visible in 'Status Bar'	Other action for UI/ 'camera symbol'
WARMING UP	Printer is in the warm-up stage. Spooling of print jobs to disk is still possible.	Camera is warming up.	<None>/idle
OFFLINE	OFFLINE Printer is switched off-line. Spooling of print jobs to disk is still possible.	Camera is switched off-line.	<None>/interact
NONE	General printer warning, no specific information is available. Spooling of print jobs to disk is still possible.	--	<None>/idle

8.7.3 Additional Status Information - Kodak PACS Link

Table 98 - Print SCU Additional Kodak PACS Link Status Evaluation

Printer Status Info/ Execution Status Info	Description	Message string visible in 'Status Bar'	Other action for UI/ 'camera symbol'
SUPPLY MGZ ERR	The supply magazine has an error.	Film supply has an error.	<None>/interact

8.7.4 Additional Status Information - Kodak 190l

Table 99 - Print SCU Additional Kodak 190l Status Evaluation

Printer Status Info/ Execution Status Info	Description	Message string visible in 'Status Bar'	Other action for UI/ 'camera symbol'
PRINTER STOPPED	The printer has stopped.	Camera has stopped.	<None>/interact
FATAL ERROR	Fatal Error.	Fatal Error. Queue stopped.	**Queue for this camera will be STOPPED/ Queue stopped**

8.7.5 Additional Status Information - Kodak 2180/1120

Table 100 - Print SCU Additional Kodak 2180/1120 Status Evaluation

Printer Status Info/ Execution Status Info	Description	Message string visible in 'Status Bar'	Other action for UI/ 'camera symbol'
PRINTER NOT RDY	Printer not ready.	Camera not ready..	<None>/interact
CHECK PROCESSOR	Check processor.	Check processor.	<None>/interact
NO TONER	No toner.	No toner.	<None>/interact
FATAL	Fatal Error.	Fatal Error. Queue stopped.	**Queue for this camera will be STOPPED/ Queue stopped**

8.7.6 Additional Status Information - Codonics

Table 101 - Print SCU Additional Codonics Status Evaluation

Printer Status Info/ Execution Status Info	Description	Message string visible in 'Status Bar'	Other action for UI/ 'camera symbol'
STANDARD	Printer is ready.	Camera is ready.	<None>/Normal
LOAD A-SIZE	Load A-Size media.	Load A-Size media.	<None>/interact
LOAD A-DVPAPER	Load A-Size black and white paper.	Load A-Size black and white paper.	<None>/interact
LOAD A-CVPAPER	Load A-Size color paper.	Load A-Size color paper.	<None>/interact
LOAD A-CVTRANS	Load A-Size transparencies.	Load A-Size transparencies.	<None>/interact
LOAD A4-SIZE	Load A4-Size media.	Load A4-Size media.	<None>/interact
LOAD A4-DVPAPER	Load A4-Size black and white paper.	Load A4-Size black and white paper.	<None>/interact
LOAD A4-CVPAPER	Load A4-Size color paper.	Load A4-Size color paper.	<None>/interact
LOAD A4-CVTRANS	Load A4-Size transparencies.	Load A4-Size transparencies.	<None>/interact
LOAD LA-SIZE	Load LA-Size media.	Load LA-Size media.	<None>/interact
LOAD LA-DVPAPER	Load LA-Size black and white paper.	Load LA-Size black and white paper.	<None>/interact
LOAD LA-CVPAPER	Load LA-Size color paper.	Load LA-Size color paper.	<None>/interact
LOAD LA-CVTRANS	Load LA-Size transparencies.	Load LA-Size transparencies.	<None>/interact
LOAD LA4-SIZE	Load LA4-Size media.	Load LA4-Size media.	<None>/interact
LOAD LA4-DVPAPER	Load LA4-Size black and white paper.	Load LA4-Size black and white paper.	<None>/interact
LOAD LA4-CVPAPER	Load LA4-Size color paper.	Load LA4-Size color paper.	<None>/interact
LOAD LA4-CVTRANS	Load LA4-Size transparencies.	Load LA4-Size transparencies.	<None>/interact
LOAD XLA-SIZE	Load XLA-Size media.	Load XLA-Size media.	<None>/interact
LOAD XLA-DVPAPER	Load XLA-Size black and white paper.	Load XLA-Size black and white paper.	<None>/interact
LOAD XLA-CVPAPER	Load XLA-Size color paper.	Load XLA-Size color paper.	<None>/interact
LOAD XLA-CVTRANS	Load XLA-Size transparencies.	Load XLA-Size transparencies.	<None>/interact
LOAD XLA4-SIZE	Load XLA4-Size media.	Load XLA4-Size media.	<None>/interact
LOAD XLA4-DVPAPER	Load XLA4-Size black and white paper.	Load XLA4-Size black and white paper.	<None>/interact
LOAD XLA4-CVPAPER	Load XLA4-Size color paper.	Load XLA4-Size color paper.	<None>/interact
LOAD XLA4-CVTRANS	Load XLA4-Size transparencies.	Load XLA4-Size transparencies.	<None>/interact
LOAD XLW-SIZE	Load XLW-Size media.	Load XLW-Size media.	<None>/interact

Printer Status Info/ Execution Status Info	Description	Message string visible in 'Status Bar'	Other action for UI/ 'camera symbol'
LOAD XLW-DVPAPER	Load XLW-Size black and white paper.	Load XLW-Size black and white paper.	<None>/interact
LOAD XLW-CVPAPER	Load XLW-Size color paper.	Load XLW-Size color paper.	<None>/interact
LOAD 8X10-SIZE	Load 8x10 media.	Load 8x10 media.	<None>/interact
LOAD 8X10-DVFILM	Load XLW-Size black and white film.	Load XLW-Size black and white film.	<None>/interact
SUPPLY MISSING	The film supply magazine specified for this job is not available.	Film supply not available.	<None>/interact
RIBBON MISSING	Ribbon is missing.	Ribbon is missing.	<None>/interact
RIBBON EMPTY	Ribbon is empty.	Ribbon is empty.	<None>/interact
TOP COVER OPEN	Top cover of printer is open.	Top cover of camera is open.	<None>/interact

8.7.7 Additional DICOM Execution Status Information

Table 102 - Print SCU Additional DICOM Execution Status Info Evaluation

Printer Status Info/ Execution Status Info	Description	Message string visible in 'Status Bar'	Other action for UI/ 'camera symbol'
INVALID PAGE DES	The specified page layout cannot be printed or other page description errors have been detected.	Film Job cannot be printed on this camera. Queue stopped. Please redirect film job.	**Queue for this camera will be STOPPED/ Queue stopped**
INSUFFICIENT MEMORY	There is not enough memory available to complete this job.	Not enough memory available in camera. Queue stopped. Please continue queue or change camera.	**Queue for this camera will be STOPPED/ Queue stopped**
NONE	General printer warning, no specific information is available. Spooling of print jobs to disk is still possible.	--	<None>/Idle

8.7.8 Unknown DICOM Execution Status Information

Printer Status Info and Execution Status Info are defined terms and can therefore be extended or reduced by camera manufacturers. Therefore syngo X-Workplace Print AE shall be flexible.

If any other printer status info or execution status info is received, syngo X-Workplace will react as shown in the following table:

Table 103 - Print SCU Unknown DICOM Execution Status Information

Printer Status/ Execution	Printer / Execution Status Info	Description	Message string visible in the HCD 'Status Bar'	Other action for UI/ 'camera symbol'
WARNING	<any other>	<not defined status info>	Camera Info: <status info>	<none/interact>
FAILURE	<any other>	<not defined status info>	Camera Info: <status info> Queue stopped	**Queue for this camera will be STOPPED/ Queue stopped**

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